

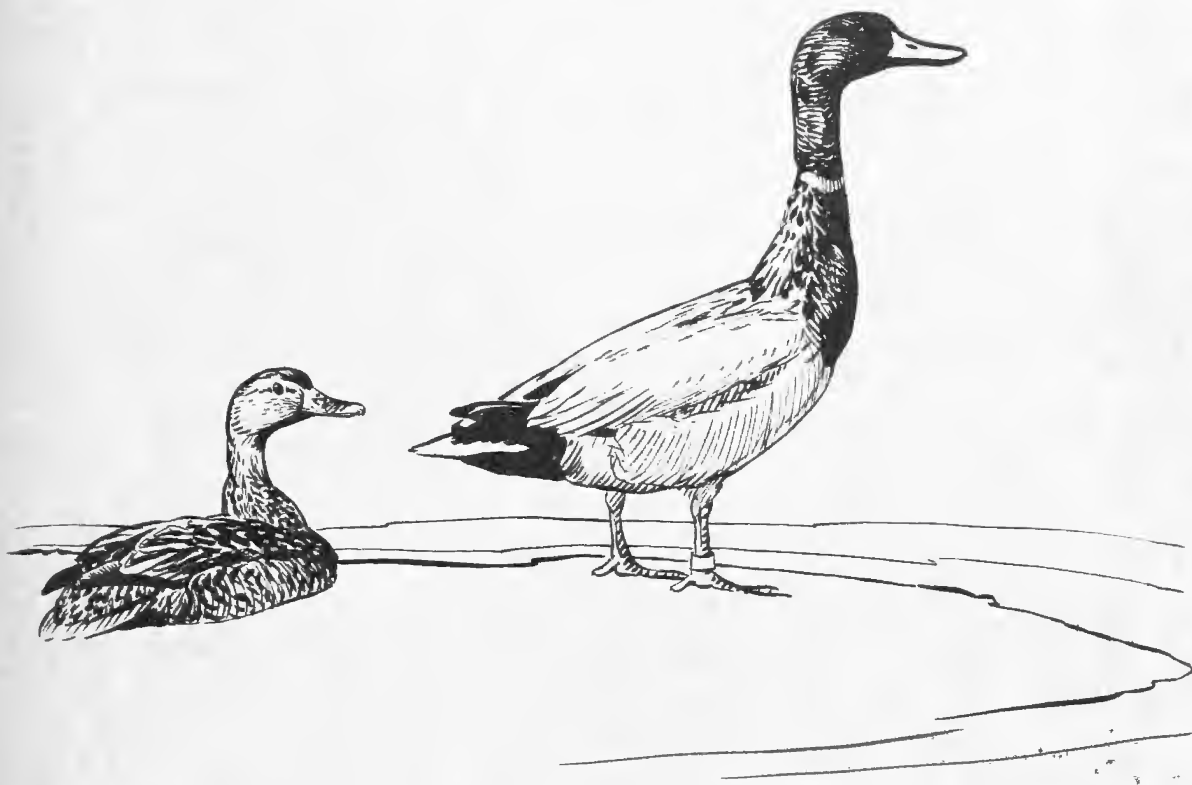


U.S. Department of Agriculture
Animal and Plant Health Inspection Service
Wildlife Services

Historic document – Content may not reflect
current scientific research, policies or practices.

WATERFOWL STATUS REPORT 1964

LIBRARY
/ Denver Wildlife
Research Center



**UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE
Special Scientific Report--Wildlife No. 86**

Created by act of Congress in 1849, the Department of the Interior is responsible for a wide variety of programs concerned with the management, conservation, and wise development of America's natural resources. For this reason it is often described as a department of natural resources.

Through a score of bureaus and offices the Department is responsible for the use and management of millions of acres of federally owned lands; administers mining and mineral leasing on a sizable area of additional lands; irrigates reclaimed lands in the West; manages giant hydroelectric power systems; administers grazing and forestry programs on federally owned range and commercial forest lands; protects fish and wildlife resources; provides for conservation and development of outdoor recreation opportunities on a nationwide scale; conserves hundreds of vital scenic, historic, and park areas; conducts geologic research and surveys; encourages mineral exploration and conducts mineral research; promotes mine safety; conducts saline water research; administers oil import programs; operates helium plants and the Alaska Railroad; is responsible for the welfare of many thousands of people in the territories of the United States; and exercises trusteeship for the well-being of additional hundreds of thousands of Indians, Aleuts, and Eskimos, as well as being charged with resource management of millions of acres of Indian-owned lands.

In its assigned function as the Nation's principal natural resource agency, the Department of the Interior bears a special obligation to assure that our expendable resources are conserved, that renewable resources are managed to produce optimum yields, and that all resources contribute their full measure to the progress, prosperity, and security of America, now and in the future.

UNITED STATES DEPARTMENT OF THE INTERIOR, STEWART L. UDALL, SECRETARY
Frank P. Briggs, Assistant Secretary for Fish and Wildlife
Fish and Wildlife Service, Clarence F. Pautzke, Commissioner
Bureau of Sport Fisheries and Wildlife, John S. Gottschalk, Director

WATERFOWL STATUS REPORT 1964

Compiled by

Henry A. Hansen, Assistant Chief
Branch of Surveys and Banding
DIVISION OF MANAGEMENT AND ENFORCEMENT

in collaboration with
DIVISION OF WILDLIFE RESEARCH



Bureau of Sport Fisheries and Wildlife
Special Scientific Report—Wildlife No. 86
Washington • October 1964

CONTENTS

	Page
WINTER SURVEY	1
BREEDING GROUND SURVEYS	2
Alaska	2
Northern Alberta, Northeastern British Columbia, Northwest Territories, and Yukon	5
Southern Alberta	6
Washington	8
Oregon	8
California	9
Nevada	9
Utah	10
Idaho	11
Southern Saskatchewan	11
Montana	13
Tri-State Area (North and South Dakota and Minnesota)	14
Nebraska	14
Wyoming	15
Colorado	15
Northern Saskatchewan, northern Manitoba, and western Ontario	16
Southern Manitoba	16
Minnesota	17
Michigan	18
Wisconsin	18
Indiana	19
Iowa	19
Missouri	19
Southwestern Manitoba	20
Alberta	20
Saskatchewan	20
Eastern Ontario, Quebec, and Labrador	20
BANDING AND RECOVERY DATA	21
Recovery rates from 1963 pre-hunting-season bandings of mallards and black ducks	21
Preseason banding and recovery rates for blue-winged teal, 1962 and 1963	25
HARVEST DATA	26
Comparison of hunters' reports and spy-blind observations	26
Waterfowl kill survey	28
Age ratios of some important species of ducks	32
Results of goose tail collection survey, 1962 and 1963	35
APPENDIX	37
A. Waterfowl winter survey tables	37
B. Waterfowl breeding ground survey tables	51
C. Waterfowl banding and recovery tables	95
D. Waterfowl harvest data tables	109



WATERFOWL STATUS REPORT 1964

The 1964 waterfowl hunting regulations were developed from four broad, closely related categories of information as here-in reported. The groups of data are organized by flyways, from Pacific to Atlantic, with appendixes of tables to correspond.

Credit has been given to each individual or organization that submitted a re-

port. Although many of the narrative statements have been briefed, and a few tables deleted or shortened if they contained data submitted previously or in another form, the essential information from each report has been retained to the greatest extent possible.

WINTER SURVEY

Data supplied by J. D. Smith
Bureau of Sport Fisheries and Wildlife

The annual winter survey covered all major wintering areas of the United States and Mexico. In Mexico the Bureau of Sport Fisheries and Wildlife organized and conducted the survey. In the contiguous United States, the Bureau organized the survey, but much of the field work was done by personnel of State conservation departments. The U. S. Department of Defense and the U. S. Coast Guard supplied aircraft for aerial counts in many areas.

The objectives of the annual winter survey are primarily to determine the distribution of waterfowl on the wintering grounds and to detect gross changes in the

condition of winter habitat as measured by the comparative utilization of that habitat by waterfowl.

Only for a few species such as the swans, geese, redheads, canvasbacks, and black ducks are the winter survey results used to help measure annual population status. The status for most waterfowl is determined from spring and summer surveys on the nesting grounds; those surveys provide the best information for the setting of annual hunting regulations.

The winter survey is not an accurate measure of annual waterfowl population changes because there are differences

each year in visibility, in observers, in weather, and in a host of other factors. However, the winter survey data have great value for determining the use made of various wintering areas and the change in waterfowl distribution from year to

year in response to changing weather and habitat conditions.

All data referring to the 1964 winter survey are based on observed birds -- appendix tables A-1 to A-17.

BREEDING GROUND SURVEYS

The breeding ground surveys are cooperative. The Bureau of Sport Fisheries and Wildlife, the Canadian Wildlife Service, the Provincial game branches, Ducks Unlimited, and the State conservation departments combine their equipment and manpower to conduct the necessary surveys throughout the vast extent of the waterfowl breeding range.

Flyway biologists of the Bureau survey most of the important waterfowl breeding areas in Alaska, Canada, North Dakota, South Dakota, and Minnesota from the air. Statistically designed sampling techniques and similar methods of collecting and analyzing data are used throughout these areas. In addition, many of the Northern States conduct breeding ground surveys which may vary somewhat but are generally similar in methods to those employed in the Dakotas, Canada, and Alaska.

The aerial crews count the birds on somewhat less than 1 percent of the total breeding area. This is sufficient coverage to reduce sampling error to less than 20 percent of the average population density in most survey areas, and to much less than 20 percent when considering the breeding range as a whole.

The results of the breeding ground surveys are presented as indexes. When conducting aerial surveys of breeding birds or of broods, not all birds present are seen by the aerial crews. Methods are being developed to measure the proportion of birds present but not visible from the air. These studies have not progressed to the point where visibility factors can be determined throughout the breeding range. Therefore, the indexes in this report are based on birds actually seen, and it is emphasized that they do

not constitute estimates of the total numbers present.

Surveys are conducted for the purpose of estimating the relative size of the fall flight from each of the breeding areas. Two coverages are required to obtain the necessary information: during May and June to measure distribution and relative size of the breeding population, and during July to forecast the relative number of young that will be produced. It is necessary to make an estimate of the number of young that will be produced, since only a part of the eggs will have hatched before the shooting regulations are established. The production survey, therefore, is a measure of the number of broods on the water at the time of the survey plus a measure of weather, water, and other conditions that affect or reflect production success following the survey period.

Results of the May breeding population survey and of the later production survey, which form the basis for forecasts of changes in the relative size of the fall flight, are contained in tables B-1 to B-70.

ALASKA

Data supplied by Henry A. Hansen and James G. King, Jr., Bureau of Sport Fisheries and Wildlife

Based on the past 8 years of air and ground surveys, the stratification of Alaska's waterfowl habitat for sampling purposes was changed in 1964 to comprise two strata based primarily on like ecological characteristics. Stratum 1 encompasses all the treeless, coastal

tundra from the Alaska Peninsula north through the Noatak and Selawik valleys; stratum 2 contains the spruce-muskeg habitat of the interior from the Innoko and Koyukuk River valleys east to the Canadian border. Stratum 3 designates the mountain valleys of southern Yukon and northwestern British Columbia.

Data from previous years have been recalculated within the new strata so that figures are comparable for 1963 and 1964.

Weather and habitat conditions

The weather book for Alaska was completely rewritten in May 1964. Phenologically, conditions were at least a month late, from the southeastern coastal areas to the Bering Sea and Arctic coasts and throughout the interior.

Waterfowl movements and behavior were directly, and adversely, affected by the following conditions: The spring thaw began in a routine manner in April. The winter's sparse snowfall in the low river valleys melted rapidly and created runoff ponds. Pintails, mallards, and white-fronted and Canada geese started to arrive on schedule in the Fairbanks area by April 20-22. By May 1 the temperatures had dropped, and soon all the open ponds froze. On the night of May 8, for example, the temperature dropped to -1° in contrast to 72° on the same date in 1963. Even the day-time temperature seldom reached much above freezing until the middle of the month. The Tanana River ice pool was won on May 20, the latest date in its long history. When the Tanana, the first of the major rivers to break, finally opened there was still over 6 feet of solid ice in the Black River above Fort Yukon. It was June 3 before the ice finally cleared the river at Fort Yukon. Some of the larger lakes and most of the smaller permanent ponds had some open water around their edges by the first of June, but they all contained ice. All lakes, large enough, had ice solid enough to land on skis. The mouth of the Yukon River was still frozen on June 10.

When the cold weather finally broke by the first of June, temperatures soared.

The heavy snow pack in the mountains and near the coast melted rapidly, flooding many of the lower nesting grounds. On June 5, black brant and cackling goose nesting grounds were a solid sheet of water from snow melt. The Bering Sea coast was still frozen, which prevented this water from running off through its normal channels. Large flocks of brant and geese, which would ordinarily be incubating by this date, were flying aimlessly about the outer delta. There were many snow geese still passing north up the Bering Sea coast enroute to Siberia, exceptionally late for them. Very few whistling swans were nesting on the Yukon-Kuskokwim Delta by June 5. Normally, most of them would already be well into incubation.

With the severe temperatures of early May, most of the pintails and mallards which had arrived on schedule departed from the interior. Of those that remained, many became emaciated, and some mortality was reported. This physiological setback will undoubtedly have an adverse effect on the productivity of at least the early nesting species.

Breeding population index

There was no significant change in the total duck breeding population or in any of the numerically important species with the exception of mallards, which were down about 20 percent. There was a definite shifting of the population from the interior to the coastal habitat; the interior was down by 15 percent and the coastal was up by an equal percentage. Apparently, when the ducks pulled back from the early May freezeup they moved to the southern coast, and many followed the ice line up through Bristol Bay and the Yukon-Kuskokwim Delta without returning to the interior. The large percentage fluctuation for several of the species counted in small numbers is not meaningful, for instance, green-winged teal and shoveler (tables B-1 to B-3). Our system of expanding these small samples into an accurate total population is not adequate for the task.

Of particular significance was the disposition of the early nesting species. In a normal year by June 7 or 8, pintails are usually counted as single males or small flocks of deserter males. Seldom are many paired pintails observed that late. As late as June 10 when the survey was terminated this year, pintails were observed not only as pairs but in sizable flocks of mixed sexes. This seemed to indicate idle hens which had either deserted an early attempt or had not attempted to nest in the first place. The late-nesting scaup and scoters were also rafted in flocks of mixed sexes, but there was still time for them to make a recovery unless their physiology was also derailed by the late spring.

Production indexes

As predicted at the time of the waterfowl breeding population survey, the production of all species was down from 1963. All the dabblers and canvasback--the early nesters--were particularly hard hit.

The overall trend on the two major study areas of the interior was almost identical. At Tetlin, 61 percent fewer broods were counted than in 1963. On the Yukon Flats, 58 percent fewer broods were counted. Canvasback were down 86 and 79 percent. Pintail were down 64 and 66 percent. Widgeon were down 76 and 53 percent. Mallards were down 91 percent at Tetlin but only 8 percent on the Yukon Flats. Conversely, green-winged teal were down only 30 percent at Tetlin but 68 percent on the Yukon Flats. When the first brood count terminated on July 24 it was still too early for an accurate assessment of the scaup trend. The first broods were just starting to appear.

The hatch for all species in all areas of Alaska was much later than normal. In 1963 at Tetlin, 44 percent of all broods counted were age class I, 35 percent age class II, and 21 percent age class III. On the same dates in 1964, 78 percent were age class I, 22 percent age were class II, and no broods of age class III were ob-

served. The comparison on the Yukon Flats was very similar.

In contrast to the late hatch and few broods, the average brood size was unaccountably and exceptionally large. In 1963 at Tetlin, 126 broods averaged 7.3, and in 1964, 49 broods average 7.1. On the Yukon Flats in 1963, 160 broods averaged 6.9, and in 1964, 76 broods averaged 6.8. The brood size of all species remained high (table B-4).

The calculated 90 percent loss of brant production in 1963 was verified in July of this year when a sample of 2,064 flightless birds were trapped during the moult. Of this random sample only 3.6 percent were yearlings, whereas 40 percent of a comparable sample were yearlings following the last optimum hatch.

Special Studies

Data supplied by Peter E. K. Shepherd
Alaska Department of Fish and Game

Breeding pair censuses

Ground breeding pair censuses were conducted between June 7 and 13 for the third year in succession at Minto Lakes. Conditions for the ground counts were more varied than in 1962 and 1963 with water levels much lower at the time of the surveys. These counts revealed a population of 40 drakes per square mile, a drop of 31 percent from average. Scaup were about the same, but dabblers were down 30 to 50 percent.

Nesting and Brook Surveys

There was a 20 to 25 percent decrease in black brant nesting densities. The average clutch size in 1964 was down slightly from the 3-year average, but the average brood size of 3.2 goslings at hatching was about the same.

An aerial brood count of brant suggested that this season's production equaled the average of the past 3 years and was approximately the same as in 1961.

A study was conducted in June on the Copper River Delta as part of a general reconnaissance of earthquake damage to this nesting area. The nesting population of western Canada geese was 25 percent larger than in 1963. The average clutch size of 114 goose nests was 4.3 eggs, 1 egg smaller than the average. Hatching success was 90 percent. A sample of 35 duck nests averaged 7.3 eggs. Hatching success of ducks was 65 percent. Class I broods of Canada geese averaged 4.0 goslings.

With a good late hatch of scaup it is doubtful whether brood production at Minto will exceed one-half of the 1963 crop. The average brood size of 5.5 ducklings was the smallest recorded in the past 10 years. The heaviest decrease was among the dabblers (table B-4).

NORTHERN ALBERTA, NORTHEASTERN BRITISH COLUMBIA, NORTHWEST TERRITORIES, AND YUKON

Data supplied by Robert H. Smith and
G. Hortin Jensen, Bureau of Sport
Fisheries and Wildlife

Weather and habitat conditions

A most unusual breakup occurred throughout the survey area. A premature warming began in April attended by snow melt forming open water pools. These conditions precipitated a surge of migrating waterfowl into the area only to be caught by the return of winter and the latest breakup in the memory of old timers. During this time, waterfowl were reported as a hazard to aircraft on the airport runways along the Alaska highway in Yukon, and numerous reports were received of southward-bound migrants. When spring finally broke in mid-May it came with a rush, with ice and open water conditions appearing about normal at the time of the survey, although ice was still running in the lower Mackenzie at the end of the survey period.

Precipitation during the period was very light, occurring mostly as showers of rain and/or snow. Temperatures were about normal except that during the second week of June subfreezing temperatures were reported from all coastal stations and a low of 24° was recorded at Inuvik.

Water levels along the two most southerly transects were low in the west, but were improved toward the east. Sheet water was present in small amounts in the fields, but in general the pond levels were lower than normal. Levels on the Athabaska Delta were ideal in late May, but a rampaging flood on the Peace in progress early in June could alter this situation drastically. The Slave River parklands just north of the delta were literally brimful, with habitat conditions excellent. The Mackenzie Delta was flooded again to the extent that only the highest ridges in the delta proper were above water, while the outer delta was merely an extension of the Beaufort Sea with only an occasional bush showing above the surface. Elsewhere, over most of the area, throughout the muskegs, the precambrian and the tundra water levels were about as they are from year to year with little change noticeable.

Breeding population indexes

An overall increase of 28 percent was recorded for the duck population. In general the increases were in the southern half of the survey area, with decreases north of the Arctic Circle with the exception of stratum 7. The most drastic decreases were found along the rim of the Arctic coast, the upland tundra, Mackenzie Delta, and the Old Crow Flats. This might be explained by the extremely late spring and breakup holding the birds in the more southerly areas, but the Mackenzie Delta has had repeated blows during the past several years of high water and floods, beating down production in the local population to the point where even the loons are becoming scarce. There is also the possibility that with water spread under brush and trees less of the population was visible. The outer

delta was a complete washout--the few ducks seen there were roosting on floating ice pans or on logs and trash caught in the tops of the highest willows. A survey was not made of the goose colony on the outer delta because of weather conditions; it is logical to assume that it was drowned out. Also, the colony at the Anderson Delta was a flood casualty.

All species of ducks except canvas-back increased or were unchanged from 1963. The figures pertaining to species of slight numerical importance in the area are probably of little significance, as are the coot and goose indexes. The increase in oldsquaws may well reflect the late spring and breakup, holding the birds south of their normal barren ground nesting areas. The increases in shovelers and goldeneyes are unexplained. (Table B-5.)

Production indexes

Duck production increased substantially in all areas covered except in the Athabaska Delta which was subjected to early high water from the Athabaska and a late flood on the Peace, the combination apparently flooding out most of the nests. The Mackenzie Delta experienced early high water during and shortly after breakup, but this apparently had no effect on the late hatch although the early nesters may have been affected.

Class I brood size averaged 1.2 less ducklings than last year, but class II and III broods were slightly larger than last year. Since class II brood observations were three times as numerous than the other two classes combined, it would appear that there was no significant change in brood size. (Table B-6.)

SOUTHERN ALBERTA

Data supplied by G. Hortin Jensen and
Alva E. Weinrich, Bureau of Sport
Fisheries and Wildlife

Weather and habitat conditions

During the 1963 season there was an indication that the drought gripping the

prairies and parklands of southern Alberta could be breaking. By late fall the seasonal drying trend had nullified our summer expectations. A mild, dry winter prevailed, and the spring outlook for ducks in southern Alberta was not good. Much of the habitat was the poorest observed since the beginning of these surveys.

A general storm from May 1 to 5 hit the parklands and was intensified in the southern prairies. As much as 7 inches of rain in stratum C did much to improve the condition of potholes there. There was less rain in stratum A and northerly through the parklands. This storm served only to improve soil moisture for agriculture, except along the southern border. A wet weather cycle must come to restore good conditions for waterfowl.

No significant precipitation was recorded after May 8. Shower activity was associated with the mountains and across the Milk River ridge, but nothing to raise water levels in the potholes. More than 1 inch of rain fell from Edmonton eastward on the northern parklands during the late survey period. Habitat conditions were good in that area but were dry in the western parklands.

The index for May ponds was 641,000. This was the lowest since inception of these surveys, 27 percent below the average and 24 percent below 1963. When compared with the highest years it is about half the normal complement of water areas (table B-7).

The events previously recorded for stratum C served to raise indexes 14 percent above average and 90 percent above 1963. Very dry conditions of 1963 were reversed. Attrition of water areas is quite severe in the warmer southern areas of the Province, and success of waterfowl breeding populations is more of a gamble than elsewhere in the Province.

Although the water index in stratum C is 14 percent above average and 90 percent above 1963, stratum A is a critical area. The water index is 47 percent below average and 19 percent below 1963. Neither did the gain in water units within the parklands last year persist where the index is 25 percent below average and 39 percent below last season. Much of the increase

in water of 1963 was of poor quality. Seasonal precipitation and runoff were insufficient to maintain the number of potholes through the fall and winter seasons. Even so, this will provide the significant habitat for waterfowl breeding populations this current season.

The net effect of weather patterns during the fall and winter of 1963-64 was to intensify the drought conditions within the waterfowl habitat in southern and central Alberta. The slight improvement during the 1963 season has been lost completely. Dry conditions and resulting loss of runoff from winter storms could have left waterfowl habitat in its poorest condition since surveys were started. Only significant rainfall in the south prevented this situation.

Pothole numbers in July were near normal in stratum C. But in strata A and B and for the Province percentages were 42 to 66 percent below average and comparative data from 1963.

Breeding Population Indexes

Our early prognosis for a reduced waterfowl population proved to be incorrect. Even with more severe habitat conditions the total waterfowl index for 1964 increased over 1963, dabblers by 13 percent and divers by 5 percent (table B-8).

All species of ducks showed increases from last year with one exception, the pintail. The pintail, an important duck for this area, was 20 percent below 1963 and 51 percent below the long-term average. Mallards were up slightly from 1963 but 10 percent below average. Scaup, the most important diving duck in southern Alberta, showed little change either from 1963 or from average.

The indexes for minor species of dabblers, principally gadwall and baldpate, have held up well during drought conditions. Being later nesters they have the advantage of more stable conditions during nest site selection and incubation.

Presently coots are in the northern parklands where conditions are good. The index for coots increased 45 percent over last year, returning them to their long-time average.

From lone drake ratios it appears that pintails nested earlier than mallards--88 percent and 74 percent (table B-9). Aspen began to leaf by mid-survey and leafing was complete at the end of the survey. The first brood was seen in the mid parklands on May 20. These events indicate no delay in the season.

Waterfowl production indexes

The total brood index decreased from 202,000 to 189,000, 6 percent below 1963 and 19 percent below the average of 234,000. The parklands produced more broods than last year, but the decrease resulted from extreme loss of habitat in southern areas. Brood size of 6.2 was the same as in 1963. (Table B-10.)

During the July survey departure of waterfowl from southern Alberta was evident. Mixed flocks of paired ducks were also scattered over the survey area, most noticeable in the short-grass prairie. They flushed readily, and we judge that they had given up nesting, a condition observed during earlier years of this drought.

The coot brood index was 5 percent below last year and 62 percent below average. Concentrations of as many as 500 coots were observed on larger lakes and potholes.

Conclusions

The phenology of the season was normal. Class II and III broods predominated in the survey.

The Lynch index is 87 compared with the average index of 115.

Conditions are poor for carry over of potholes for next year. Good runoff is needed for a span of several years to effect a significant upward trend in the number of potholes.

We expect a much below average fall flight from southern and central Alberta. However, it will not differ greatly from 1963.

WASHINGTON

Data supplied by Robert G. Jeffrey
Washington Department of Game

Weather and habitat conditions

The drying trend in the pothole areas, which began in some places in 1958, has continued through the current production period. The potholes in eastern Washington often produce 60 percent or more of the State's duck crop, but in 1964 it is estimated that this production will amount to only 37 percent of the total. Typical of the pothole transects is the one in Douglas County, which in May 1959 covered 84 potholes. In May 1964 there were only 35 water bodies, and by the time of the June count these had declined to 23.

The spring and early summer of 1964 were not conducive to high duck production. In eastern Washington, the spring was cold and dry which greatly retarded nesting cover growth. In western Washington it was cold and wet through the month of June.

Breeding population indexes

May transect counts in eastern Washington showed the breeding pairs to have increased by 6 percent over 1963. Irrigated areas had 20 percent more pairs, the northeastern highlands were up 10 percent, and even the drying pothole country maintained its adult duck population (up 1 percent).

Production indexes

At this time it is estimated that duck production will be down 12 percent from 1963 throughout the State (table B-11).

Brood production was down in all areas of the State with the exceptions of irrigation and the northeastern highlands. The calculated percentage of young in the fall population is 54, compared to 60 for last year.

Dabbling ducks will be down 13 percent, while the diving duck portion of the index increased by 2 percent. Of the dabblers,

mallards apparently fared the best, being 5 percent below the 1964 production.

The 1963 Canada goose production index for eastern Washington was 10,200 young plus adults. Goose production has declined 13 percent, making the index 8,900 for 1964. Much of the decline has been credited to dam construction and increased human use of the rivers.

OREGON

Data supplied by
Oregon State Game Commission

Weather and habitat conditions

A heavy winter snowfall and heavy spring rains in southeastern Oregon restored water in many of the waterfowl production areas to nearly normal levels. Precipitation in central and northeastern Oregon, however, was again below normal, and the low production which normally takes place in these areas was further reduced.

Production indexes

Goose production remained high throughout the breeding range, with exceptionally good success in the Klamath Basin. A shift of breeding birds may have taken place from nearby Klamath Marsh, which is still suffering from drought. The number of young recorded on established transects showed an increase of 27 percent from 1963. Owing to improved water conditions, duck production also increased substantially. Measurements on established transects indicate production to be 15 percent higher than in 1963. (Table B-12.)

Malheur Lake, which was dry throughout the drought period, now contains 20,000 acres of marsh and water with depths ranging to 3 feet. Production estimates for 1964 (not included in the tables) are 34,200 ducklings, up 24 percent from the 1963 production of 27,495.

Production of both ducks and geese on the Klamath Forest Refuge is down from 1963 owing to low water levels and a late

spring. The duck production index declined from 2,490 to 1,150 (table B-13).

An excellent hatch of redheads was recorded on all large marshes, but the number of ruddy duck broods tallied on the transects showed a marked decrease (table B-14).

CALIFORNIA

Data supplied by J. R. LeDonne,
F. M. Kozlik, Harry George,
William Anderson ^{1/}

Weather and habitat conditions

Water conditions in northeastern California were nearly normal this year. Some water impoundments and marshes were drier than last year but still provided adequate nesting habitat. Rainfall was below normal, but snow pack at higher elevations provided good runoff to most of the production areas. Some flooding of nests occurred in the early part of June from late rain storms and runoff from the snow pack.

The Central Valley received below normal rainfall over the entire area. Cool weather prevailed during May and June. The rice and associated vegetation which provides nesting cover was the same as 1963.

The spring was mild, and migration began early. By the end of April most of the birds had left the wintering grounds.

Production index

The survey flights in the Central Valley were conducted on May 21 and 22, and those in northeastern California from June 1 through June 5. As summarized

in tables B-15 and B-16, the California waterfowl surveys indicate --

1. A 36 percent decrease in the breeding pairs of Canada geese and an 8 percent decrease in the total fall population.
2. The breeding pairs of ducks were essentially the same as 1963; the fall population showed an increase of 7 percent.
3. The total fall population of coots showed a 45 percent increase.

NEVADA

Data supplied by C. V. Oglesby
Nevada Fish and Game Department

Weather and habitat conditions

Late winter snowfall and spring rains resulted in considerable improvement in water and habitat conditions in Nevada. Early season forecasts for stored water and streamflow were poor, but late winter and spring storms brought above normal precipitation throughout the northern part of the State.

Reservoir storage as of April 1, 1964, was estimated at 85 percent of average, with some reservoirs above average. East slope Sierra streamflow was down, but stored reservoir water was adequate to offset most deficiencies in western Nevada. Habitat conditions continued to show improvement in western Nevada, and natural marshes and management areas are being restored.

In contrast to the below average Sierra snow pack, the snow pack in the Humboldt River drainage in northeastern Nevada was near or above average. This improved streamflow and nesting habitat along stream courses was good. Flooding occurred along the Humboldt River resulting in some loss to early nesting species. Water conditions appear adequate for good brood survival in most key production areas.

Breeding population index

The 1964 duck breeding population showed an increase of 47 percent over

^{1/} Credit is due Edward J. O'Neill and Robert Russell of the Tule Lake National Wildlife Refuge for gathering the data on that area.

1963. Dabblers increased 36 percent and divers were up 58 percent. The Canada goose breeding population was up 15 percent over 1963. (Table B-17.)

Production index

Results of brood surveys indicate an increase in duck production over 1963 of 111 percent. Increased production was noted in all major nesting species. A total of 6,477 young ducks was observed this year on established sample areas as compared with 3,069 young in 1963 (table B-18).

Conclusions

This is the second consecutive year of improved habitat conditions and increased waterfowl production in Nevada. Indications are that the State's contribution to the fall flight of ducks in the Pacific Flyway will be the highest since 1958.

UTAH

Data supplied by Donald A. Smith
Utah Department of Fish and Game

Weather and habitat conditions

Utah experienced one of the most extended cold periods of recent years during the winter of 1963-64. Severe cold and heavy snows persisted from about December 15, 1963, through March 28, 1964, throughout Box Elder, Cache, and Rich Counties in northern Utah. Three days later, after a sudden thaw all this snow was gone and there was literally water everywhere. Rains began shortly thereafter over the majority of the State and continued into mid-June. As a consequence, extremely high waters persisted on all marshes, both natural and man-made, to the end of June.

All irrigation reservoirs are full, and supplies are being diverted. This should result in good water over the State's

marshes throughout the summer and into the fall.

Breeding population indexes

No major change in species composition of breeding ducks was noted in northern Utah, although a reduction in divers was noted in the southern trend areas. The "slack" created by lower numbers of red-heads and ruddy ducks on these marshes was taken up by green-winged teal. The substantial increase noted in teal could be a result of the retarded migration. There was a 4 percent decrease in mallards and a 3 percent increase in gadwalls on southern marshes. (Tables B-19, B-20, and B-21.)

Production indexes

Apparently the late spring affected Canada goose production in Utah. Both the numbers and the size of broods on marshes of the northwestern portion of the State were down significantly from 1963 (table B-22).

Counts of a moulting flock of geese on Neponset Reservoir in Rich County revealed a 20 percent increase in the size of this population from 1963. This indicates that (1) there were more geese of a nonbreeding age contributing to this moulting population, (2) there were breeding geese which failed at nesting and migrated to the moulting area, or (3) a combination of these factors took place. It is likely the latter occurred in view of the high goose population we had in 1963 and considering the weather during the spring of 1964.

The continued increase in numbers of broods indicates that a significant proportion of production losses on northwestern marshes was caused by weather and suggests that flooding was a primary factor. This area experienced the same severe weather conditions as the more western marshes, but because goose nesting there is primarily confined to hay stacks, losses were minimal. The greatest number of broods and young geese was recorded in Rich County since counts were initiated in this area.

Conclusions

Observations more recent than the brood counts indicate that, because of the abundance of water during May and June, broods may have been scattered and production was not as low as the counts suggested. This was specifically noted in the Ogden Bay marsh from distant areas which had been flooded but were drying. These temporarily flooded areas were not included in the brood surveys. It is possible the water factor could have an influence on counts made on other areas as well as Ogden Bay.

It is concluded that Canada goose production in Utah is down from 1963, but the reduction is not as pronounced as first suspected. The loss was due to failure to nest, and not to a reduced breeding population.

IDAHO

Data supplied by Elwood G. Bizeau
Idaho Fish and Game Department

Weather and habitat conditions

Spring temperatures throughout Idaho were below normal. Spring precipitation was above normal. This weather combination resulted in one of the most retarded waterfowl nesting seasons on record. Goose nesting in particular ranged from 2 to 3 weeks later than usual in all major production areas.

Spring waterfowl movements were generally late and spread over a longer period than normal. This pattern tended to obscure peak counts and made comparison with former years impractical.

Flooding was a general problem in southeastern Idaho in late spring as the heavy snow pack melted. Most reservoirs were full to overflowing by June, and considerable early duck nest loss occurred.

Breeding population indexes

Total geese for all units was down slightly (-7 percent) from 1963 but re-

mained far above the long-term average. The one major unit which showed a large drop in breeding numbers from 1963 was Dingle Marsh in southeastern Idaho (table B-23).

Production indexes

For all Idaho units combined, gosling production was 14 percent below the top production year of 1963 and 14 percent above the long-term average. Gosling production for the resident goose flocks of southwestern Idaho was down slightly from 1963 (-5 percent) but 32 percent above the long-term average (table B-24).

For the largely migratory goose flocks of southeastern Idaho, production was down appreciably from last year (-35 percent) and down from the long-term average (-28 percent). A variety of local losses including flooding, predation, and nest disturbance by fishermen caused the drop in goose production for southeastern Idaho. The primary factor which triggered the local production losses was the delayed nesting caused by winter extending well into the normal spring period.

Duck production trend routes were censused at Blackfoot Reservoir in southeastern Idaho and on the Milner Canal in south central Idaho. Routes were run twice with all classes of broods counted on the early July run and only class I broods included for the late July survey. The duck brood trend on both routes was down somewhat from the excellent production year of 1963 (table B-25). Other brood routes were run only once because of the extremely late duck nesting season, hence are not comparable with previous years' data and are not included in this report. Good distribution and abundance of water and evidence of much re-nesting indicate that the current year's duck production in Idaho will be above average by the end of the season.

SOUTHERN SASKATCHEWAN

Data supplied by Rossalius C. Hanson
and Gerald Pospichal
Bureau of Sport Fisheries and Wildlife

Weather and habitat conditions

The Saskatchewan prairies this spring had a variety of water conditions, from excellent in stratum A-East to very poor in stratum C. The prairies were generally very dry in the fall of 1963. The winter snowfall was near normal but did not bring water in the ponds up to their normal levels. Rainfall from April 1 to May 25, 1964, was up 0.6 of an inch from normal. This put water in a number of depressions but still at a very shallow depth.

The May pond indexes in 1964 for strata A-West, B-West, and C were below those of 1963. Strata A-East and B-East were up, with A-East showing an increase of 112.2 percent. The total pond index this May was 1,188,700 compared with 960,400 in 1963, an increase of 23.8 percent. This increase was due mainly to the major improvement in A-East. At the outset this looks good, but the water was universally poor in quality except in A-East. In most areas the ponds had only a few inches to a foot of water. Most of them were still 1 to 3 feet below their normal levels. Water conditions in eastern Saskatchewan should hold up relatively well throughout the production season, but most of the other areas will have to be supplied with adequate summer rains. The Coteau, north and east of Johnstone Lake, was the poorest we have seen.

Temperatures from mid-April to May 25 averaged 3° to 5° above normal and broke some all-time high records. Regina had 94° as its highest reading. From May 1-25 the wind averaged 18.4 miles per hour each day. Spring was a week to 10 days ahead of normal. The warm weather produced early emergent vegetation and leafing of trees and shrubs. By mid-May, vegetation in the parkland areas was well-leafed.

Habitat and weather conditions for nesting were good. The early growth of pond vegetation in addition to emergent plants from last year afforded adequate cover. Practically no burning was noted, and there appeared to be little seeding of stubble. The soil moisture for seeding

of grain was adequate. However, after the unusually warm spring and high winds, forecasts for agricultural crop moisture needs indicated a necessity for rains to insure crop success. This may have discouraged stubble seeding to some degree.

Drying trends continued through early July except for scattered rains generally in the east and central parts of the Province. Overall, the water loss from May to June was 63 percent. The July pond index for 1964 (439, 500) was the third lowest on record, down 36.2 percent from 1963 (689,100) and down 68.1 percent from the 1952-63 average (table B-26). In parts of A and B-West, the number of dugouts and stock dams exceeded the number of natural water areas in July.

Breeding population indexes

The total duck population index stood at 1,681,200 birds this year compared with 1,539,300 last year, with an average of 3,427,900 for 1956 to 1963. Dabblers and divers showed increases over last year of 7.9 and 21.5 percent, respectively, down 49.7 and 60.1 percent from the averages. The coot population increased 64.9 percent over last year, but they are still 76 percent below the average (table B-27).

The lone drake index of 83.5 percent agrees with all other indicators of an early season. The percentage figure for this year is the second highest on record (table B-28).

Production indexes

The 1964 duck brood index was up 46 percent from the low of 1963 but still remained 71 percent below the average, and the third lowest on record. Data from both the aerial and ground observations indicate poor success from early nesting efforts in the south part of the Province. As indicated by age classes in observed broods, early nesting success improved as we moved northward in the survey area. Average brood size from class II and III broods was 5.7 as

compared with 5.4 in 1963. The coot brood index was up 76 percent from 1963 but down 75 percent from the average (table B-29).

The drying trends from May through early July caused a 63 percent drop in the water index by the time of the July coverage. Except for the extreme north and east borders of the survey area (parkland type), water generally remained mainly in the larger permanent type areas, dugouts, and stock dams. These, in most cases, were open types with mud flats and little vegetation and allowed a greater proportion of total broods present to be observed. This condition also concentrated the birds.

The Saskatchewan 1964 late nesting index was 28.9 percent below 1963 and 49.8 percent below the long-term average. It is the third lowest on record. Dabblers, which comprised 66 percent of the late nesting index this year, were down 42.1 percent and 59.5 percent in the above comparisons.

Both air and ground crews conducting air-ground visibility checks reported large numbers of adults of both sexes which had apparently abandoned their nesting efforts and assembled on lakes.

MONTANA

Data supplied by Dale Dewitt
Montana Department of Fish and Game

Weather and habitat conditions

Water conditions declined in the three eastern areas but are still average or better. There was improvement in the Great Falls Piedmont which had been a drought area the last 4 years. The May water condition in the unglaciated prairies were equal to or down slightly from last year, which was one of the best years on record. The May water conditions in the Flathead Valley or Pacific Flyway portion of the State were average or better.

The late water conditions could be considered improved in nearly all areas in

the State. In several areas records were set causing some of the worst flooding in history on the river systems.

In the Great Falls Piedmont the June and July water conditions were probably better than any ever recorded (table B-30).

Breeding populations indexes

The May survey of the glaciated subdivisions indicated an increase in total ducks over last year. In the unglaciated prairie the waterfowl index is above average. On the McCone County trend area the waterfowl index was 2.1 ducks per square mile compared with 1.6 ducks per square mile for the 12-year average and 3.7 ducks per square mile last year. The waterfowl breeding population from the Flathead Valley trend is not included this year because of incomparability of data.

In the Hi-Line Unit the Canada goose trend census during the early nesting season indicates an increase in breeding birds over last year (table B-31).

Production indexes

Production and breeding conditions in the Central Flyway portion of Montana should be excellent. There undoubtedly was some flooding in the river valleys in the Great Falls Piedmont, but considering the improved water conditions in the potholes and reservoirs in this unit the number of birds using the river valleys would be insignificant.

In the Pacific Flyway (Flathead Valley), production and brooding conditions are generally very good. Even so, the production trend in this unit decreased from last year, probably because of poor counting conditions. It is possible the production is off somewhat, but probably not as much as the data suggest.

In the East Slope Unit, the population trend during the nesting season was down slightly from last year (table B-32).

There was some flooding in this unit, and the count may be down because of poor census conditions on the Marias

River, which was at flood stage, and on Alkalie Lake, which was 3 or 4 times its normal size.

TRI-STATE AREA (NORTH AND SOUTH DAKOTA AND MINNESOTA)

Data supplied by Glen V. Ortin
and Bonar Law
Bureau of Sport Fisheries and Wildlife

Weather and habitat conditions

There was very little spring runoff, and pothole conditions were poor over most of the survey area until mid-April. Heavy local rains improved the water situation in scattered districts of the tri-State area from mid-April to early May. During May, 80° to 90° temperatures and strong winds practically nullified the earlier gains in water levels in the Dakotas. The May 1964 water index was down 47 percent from 1963 and down 17.1 percent from the 6-year average. Total precipitation for the year remained below average over most of the survey area. Many potholes that produced broods in 1963 were dry by mid-April.

Farming operations were about 10 days behind the 1963 schedule, although soil moisture conditions were good. Burning of dry sloughs and roadside ditches was observed during May and probably destroyed some of the early nesting attempts.

The poor pothole conditions in north-central South Dakota and south-central North Dakota were considerably improved by very heavy local rains in June. Conditions over the remainder of the survey area, except extreme northwestern North Dakota and west Minnesota, remained poor (table B-33).

Breeding population indexes

Dabblers decreased 35.8 percent from 1963, but were about equal to the 6-year average. Canvasback and redheads increased 16.7 percent and 17.9 percent

respectively compared to 1963, and 75 percent and 80 percent compared to the long-term average. Scaup and ruddy ducks showed major declines in both of the above comparisons.

In summary, the total duck index for the tri-State area is 36.8 percent below 1963 but about equal to the 6-year average. Coots were 29.5 percent below 1963 and 27.2 percent below the average (table B-34).

The lone drake index of 67.6 percent indicates that nesting was well under way (table B-35).

Production indexes

From all indications early nesting efforts were very poor. The tri-State brood index was 31.7. Total duck broods decreased 70.7 percent from 1963 and 49.5 percent from the 6-year average. Average brood size in 1964 was 6.0 compared with 5.2 in 1963. Coot broods decreased 34 percent from 1963 and 17.1 percent from the average. Ground observations of the air-ground comparison crew and banding crews in the Dakotas tend to substantiate these figures (table B-36).

NEBRASKA

Data supplied by George Schildman
Nebraska Game, Forestation and Parks
Commission

Weather and habitat conditions

Water conditions during the breeding ground survey were generally good. Heavy rains during the last week of April filled the lakes in the central Sandhills. The eastern part remained much below normal while the western areas were only a little below normal. The projected water index for all of the Sandhills was 55, 977.

Weather conditions during the spring were dry and cool. Temperatures remained relatively cool until mid-June. There were no late freezes this year.

Good general rains did not occur, but local rains maintained water levels in the central Sandhills.

Breeding population indexes

The waterfowl index for the Sandhills was up 16.6 percent from last year and 9.7 percent above the average of the previous 5 years. The calculated breeding population for the Sandhills was 124,809 ducks of all species.

Most notable changes in the species composition of the breeding population was a 55 percent decrease in blue-winged teal and an 83 percent decrease in gadwall. Mallards and pintails showed increases of 78 percent and 84 percent respectively. Shovelers remained about the same as last year. Scaup, redheads, and canvasbacks showed substantial increases, while ruddy ducks declined from 5,300 to 880. (Table B-37).

Production indexes

A total of 75 broods were observed on the July aerial survey. Good counts were obtained on 63 broods with a total of 295 ducklings. The total number of broods sighted was down 30.0 percent from the 1963 figure, and the number of ducklings was down 44.2 percent. Ground route indexes indicate broods down 48 percent and ducklings down 49 percent. The number of ducklings per brood from the aerial counts was 4.68, a decrease of 1.20 from 1963, while the average brood size from ground routes indicates a drop from 5.42 to 5.31. (Table B-38.)

The hatch appeared to be as much as 2 weeks later than last year. New broods were still appearing during the third week of July. According to the aerial surveys, 5.8 percent of the ducklings sighted were class I, 38.6 percent were class II, and 55.6 percent were class III (table B-39).

WYOMING

Data supplied by George F. Wrakestraw
Wyoming Game and Fish Commission

Weather and habitat conditions

Range and water conditions at the start of the spring migration were good over most of the State. During May and early June great amounts of moisture fell over most of the State, maintaining extremely good water conditions. The number of water areas in the production sections of the State remained nearly constant through July.

Breeding population indexes

The estimated breeding pair population for 1964 decreased 6 percent from 1963 but increased 20.5 percent over the long-term average.

Production indexes

The total number of birds counted in 1964 was 301,705, 1 percent above 1963 and 28.8 percent above the 8-year average (table B-40).

Canada geese decreased 2 percent from 1963 but were 53 percent above the long-term average.

Goose production surveys on Bear River, Snake River, and Ocean Lake indicate an extremely successful year (table B-41).

COLORADO

Data supplied by William H. Rutherford
Colorado Game, Fish and Parks
Commission

Weather and habitat conditions

Weather conditions in Colorado during the spring and early summer were considered good to excellent for waterfowl nesting and production. The phenology of the season was retarded, so that nesting was not started as early as usual, but weather was not an adverse factor. Water conditions were somewhat better than those of last year, but still only fair. Early spring precipitation vastly improved

what had started out to be a dry season. It appears that sufficient water is available for nesting and brood rearing in all areas of the State except the San Luis Valley.

Breeding population indexes

The 1964 counts were up 17.2 percent from 1963, and 98.4 percent above the 1954-1963 average.

In an attempt to refine the sampling technique in the San Luis Valley, aerial transect coverage was doubled and air-ground comparison transects were established. This permitted a better estimate of the total breeding population and a considerably improved estimate of species composition (table B-42).

Species composition was about the same as those of past years. Pintail, widgeon, shoveler, and redhead were up somewhat, with other species stable or slightly down (table B-43).

Production indexes

The western slope Canada goose breeding flock has been steadily increasing the past several years. The largest number of adult geese and the highest indicated level of production since the beginning of the study in 1956 occurred this year (table B-44).

NORTHERN SASKATCHEWAN, NORTHERN MANITOBA, AND WESTERN ONTARIO

Data supplied by Arthur R. Brazda
and Gust J. Nun
Bureau of Sport Fisheries and Wildlife

Weather and habitat conditions

Spring breakup was early, but high winds and a recurrence of winter conditions delayed completion of the survey. Snow showers were encountered as late as June 6. On June 1 thousands of snow and blue geese were concentrated along the bay

shore around Winisk owing to the severe winter conditions there and farther north. Northern Saskatchewan and northern Manitoba were very dry throughout the summer. Except for scattered light showers, northern Saskatchewan was void of rain from early May until mid-July. On July 10 there were 57 forest fires in the Prince Albert District alone, some of them large.

Water conditions on Saskatchewan 1 were only fair in the Big River area, but good in the Meadow Lake area and along the Beaver River. In Delta 1 and 2, water appeared to be down slightly from 1963. In Manitoba, habitat conditions appeared adequate in the eastern two-thirds of the province, but only fair in the western third. Water conditions in Ontario were equal to or better than 1963.

Breeding population indexes

Overall, the duck population increased 3 percent from 1963. Small increases in Manitoba and Saskatchewan south of 55° 30'N. were mostly offset by an 11 percent decrease in Ontario. The coot population decreased 56 percent. The Canada goose breeding population decreased 11 percent. The total duck population index in 1964 was 812,146 compared with 787,657 in 1963 corrected for comparable coverage. (Table B-45.)

Production indexes

The production index increased by 217 percent over 1963. Only Ontario indicated a slight decrease. The age classification suggested that the first nesting attempt was excellent. Class II and III broods represented 89 percent of all broods observed (tables B-46 and B-47). Class II and III broods averaged 5.0. Canada goose broods averaged 3.1.

SOUTHERN MANITOBA

Data supplied by Morton M. Smith
and Duane Norman
Bureau of Sport Fisheries and Wildlife

Weather and habitat conditions

Vegetation at the beginning of the survey was considered normal for the area. Aspens and willows, fully leafed out by the time the more northern transects were covered, reduced the efficiency of aerial observations on some areas.

Manitoba stratum A had more water areas in May 1964 than in any previous year of record, up 34 percent over 1963 and 54 percent above the 11-year average. In stratum B, the same number of water areas were recorded in 1963 and 1964. The B counts for the last 2 years are 11 percent below the 11-year average. When the 1964 figures for strata A and B are combined, the number of water areas tallied is the third highest on record and 15 percent higher than the 11-year average.

Habitat conditions in southern Manitoba continued better through July than in any year since the late 1950's. The July pond counts were higher than in any recent year but still below the long-term average (table B-48).

Conditions in stratum B this year did not appear quite as favorable as in 1963. In spite of a higher pond count in 1964 many of the marshy areas east of Lake Manitoba were low or dry, and pond levels on the three most northern transects were lower this year than last.

Breeding population indexes

The 1964 duck population index was 5 percent less than in 1963, and 28 percent below the 11-year average. The dabbling duck index was down 12 percent and 40 percent, respectively. The diving duck index increased 9 percent above 1963, and nearly 10 percent above the 11-year average. Coots increased 3 percent over 1963 and the index now equals the long-term average (tables B-49 and B-50).

The 1964 lone drake figure of 78 percent is lower than that of 1963 but about average for southern Manitoba (table B-51). The first brood were seen on May 22--the same date the first brood was

spotted in 1963. Three additional broods were seen on May 24th.

Production indexes

The duck brood index for strata A and B in southern Manitoba was 22 percent lower than that of 1963 and 27 percent below the long-term average. The coot brood index for the survey area was 266 percent greater than in 1963 and 78 percent above the 10-year average (table B-52).

The 1964 index to late nesting for the entire survey area was 10 percent below 1963 and 26 percent below the long-term average (table B-53). Despite evidence that many early nests were lost and that the 1964 hatch was later than that of 1963, fewer adults were recorded on the transects (table B-54). By mid-July, the growing concentrations of adults on the larger water areas indicated that many ducks were through nesting for the season although habitat and weather conditions appeared favorable for a late nesting effort.

CHIPPEWA NATIONAL FOREST, MINNESOTA

Data supplied by Harry Pinkham
Bureau of Sport Fisheries and Wildlife

Weather and habitat conditions

The water level reading at the Winnibigoshish Dam was 10.07 feet, 0.36 feet less than normal but 0.17 feet above the water level during the 1963 census.

Breeding population indexes

This year's survey indicates a 7 percent increase in the breeding population from the 1963 census (tables B-55 and B-56). The ratio of adult to young dropped from 1:2.5 in 1963 to 1:1.6 in 1964 (table B-57).

MICHIGAN

Data supplied by Edward J. Mikula
Michigan Department of Conservation

Weather and habitat conditions

Winter was relatively mild with precipitation below normal and temperatures above normal. Most southern waters were ice-free by early March and those in the northern part free of ice by late March or early April. As a result of these weather conditions, the spring waterfowl migration was considerably earlier than in 1963.

Precipitation during April, May, and June was below normal over most of the State. Near-record low water levels on the Great Lakes have markedly reduced useable shoreline nesting habitat. Inland water habitat appears to be about the same as last year. Temperatures during the nesting period were normal to above normal. Weather conditions had no adverse effect on nesting and brood production this year.

Breeding population indexes

The waterfowl breeding population was the third highest in 15 years but down 15 percent from 1964 (table B-58).

The percentage of mallards, blue-winged teal, and mergansers in the breeding population dropped this year, while the wood duck, black duck, and ring-necked duck population increased.

Production indexes

The number of broods tallied per lineal mile of census route was down 26 percent from 1963. Brood size was slightly larger but not enough to offset the smaller number of broods.

The number of breeding wood ducks per lineal mile of census route was below that of last year, but was offset by a significant increase of wood ducks in the total local breeding population. Brood size averaged 6.5 young per adult.

We estimate that State-wide production of waterfowl in 1964 was about 10 percent lower than in 1963 (table B-59).

WISCONSIN

Data supplied by
Wisconsin Conservation Department

Weather and habitat conditions

Wisconsin received spring rains early enough to provide breeding habitat over most of the State on a level comparable to 1963.

Water levels declined steadily through the month of June when hatching was at its peak, but rainfall in July was good and maintained brood habitat.

Breeding population indexes

Slight increases were noted in wood ducks. Mallard and blue-winged teal remained at about the same level as 1963. Although overall blue-winged teal numbers were unchanged, there were noticeable declines in the northwest and southeast, where drought has been most severe (table B-60).

Utilization of nest boxes by wood ducks was about the same as 1963. Of 199 houses checked, 17 percent were used. This compares with 18 percent use of 65 houses checked in 1963.

Production indexes

Production should be unchanged to slightly less than that of 1963. The increased breeding population got off to a late start in nesting. First mallard broods were observed on May 27, about 2 weeks later than in 1963. Brood sizes were smaller than average for the important species. Late broods will not offset the effects of the late season.

Blue-winged teal production will be less than last year, mallards about the same, and wood ducks may be slightly lower. The observations on all other

species are limited but suggest average production (table B-60).

INDIANA

Data supplied by Russell Hyer
Indiana Department of Conservation

Weather and habitat conditions

Water conditions during the breeding season were highly variable. Rainfall during the spring and early summer in the southern and central parts of the State were the heaviest for this period in recent years. In the northwestern counties, moderate to severe drought conditions have persisted for approximately a year. In northeastern Indiana, conditions have been normal.

Production indexes

During the 1964 stream survey, 57 wood duck broods were observed, a decrease of 62.0 percent from last year. Average brood size was 6.3 (table B-61).

IOWA

Data supplied by
Iowa Conservation Commission

Weather and habitat conditions

A dry fall and winter left many of the small potholes in northern Iowa very low or dry this spring.

Good rains in April helped relieve the situation some, but below normal rainfall in May, June, and July resulted in most of the small potholes going dry before broods started showing themselves. The bigger State-owned and private areas held good water levels during the spring production period. Over 75 percent of the potholes of 4 acres or less were dry by the first week of July.

High water levels and high muskrat populations on the larger State-owned areas the last 3 years have resulted in a notable decrease in the quantity of emer-

gent vegetation on the areas. Many of the larger areas that have no water control structure have very little or no emergent vegetation this year.

Breeding population indexes

Waterfowl flights moved into Iowa this spring a week or two ahead of normal. Early nesting was held back by cold and rainy weather. A sharp freeze the latter part of April froze over the marshes and killed quite a few coot and diving ducks. Nesting of mallards started the first week of May. Blue-winged teal nesting started the first week of June. Broods started showing up 1 or 2 weeks later than normal this spring.

Production indexes

Information from drive trapping shows that blue-winged teal production was down 25 to 30 percent from the extreme high of 1963, but still very good when compared with a 10-year average. Mallard and redhead production was down slightly from last year, and coot production was down 75 percent or more. The great drop in coot production was probably due to the lack of emergent vegetation, and extremely high winds this spring. Ruddy duck and the other nesters in Iowa compared quite favorably with last year. Wood duck production was up 25 to 30 percent in the prairie pothole region of Iowa. More broods of wood duck were seen and banded in 1964 than in any previous year. The production was late this year, but from all indications there will be a good late hatch.

Approximately 1,800 birds were banded this year in Iowa.

MISSOURI

Data supplied by
Missouri Conservation Commission

Weather and habitat conditions

An early spring triggered early nesting by wood ducks in Missouri. Before the

June census was completed there were broods on the wing.

Precipitation during the spring of 1964 was 1 to 6 inches above normal. Flood conditions existed on many streams and bottomland marshes throughout the census period. The scheduling of stream census activities had to be arranged between floods.

Production indexes

Wood duck nesting on marsh and lake habitat decreased by approximately 53 percent, while nesting on 730 miles of stream decreased by only 3 percent.

The number of broods sighted per mile of stream decreased from the all-time high recorded last year. The number of broods per square mile of marsh habitat decreased approximately the same. Decreases were also noted in average brood size (table B-62).

SOUTHWESTERN MANITOBA

Data supplied by Charles H. Lacy
Ducks Unlimited, Canada

Weather and habitat conditions

Water areas increased 23 percent above 1963, but conditions varied greatly from one region to another (table B-63). Brush clearing, filling of potholes, and drainage continued at a high level. A dry, open winter permitted widespread burning of pond margins with damage to nesting cover.

Breeding population indexes

The total index was 56 percent above 1963. Both dabblers and divers increased proportionately, with the exception of mallards, which are still 15 percent below the 1961 level (tables B-64 and B-65).

ALBERTA

Data supplied by Ducks Unlimited (Canada)

Weather and habitat conditions

The number of water areas decreased 36 percent below 1963 and 33 percent below the 10-year average in the Province as a whole, although conditions were better in a few localities. Good rains in early May provided excellent habitat in the extreme southern edge of the Province. The central prairies are still deep in the grip of drought.

Breeding population indexes

On the basis of 271 transects the duck population as a whole showed no significant change. Small losses in pintail, mallard, and scaup were offset by gains in the other species (table B-66).

SASKATCHEWAN

Data supplied by Ducks Unlimited (Canada)

Weather and habitat conditions

Water conditions are good in the eastern parklands, but the western half of the Province and the southern prairies are in critical condition. There was sufficient water to initiate nesting but not enough without heavy rains to secure broods until fledged.

Breeding population indexes

Provincewide the breeding population was 22 percent below 1963 but 54 percent below the 10-year average. Losses in the western half of the Province were compensated by increases in the parklands. Pintails, mallards, and gadwalls showed the greatest decline with blue-winged teal and most of the diving ducks increasing (table B-67).

EASTERN ONTARIO, QUEBEC, AND LABRADOR

Data supplied by E. B. Chamberlain
and C. F. Kaczynski
Bureau of Sport Fisheries and Wildlife

Weather and habitat conditions

Breakup in the southern and western portions of the survey area was about two weeks earlier than normal. Elsewhere, breakup varied from one week earlier to two weeks later than normal. By mid-June extensive portions of the area were experiencing moderate to severe drought conditions, but this did not appear to have any serious effect on waterfowl habitat. Lakes, rivers, and muskegs all appeared to have adequate water throughout the summer.

Over the survey area as a whole the most serious effect of the drought was the occurrence of numerous extensive and severe forest fires.

Breeding population index

There was considerable variation in the population index both among species and among strata, but much smaller variations in the total waterfowl index (tables B-68 and B-70).

The percent of lone drakes indicates that there was more nesting in progress at the time of the survey this year than in any previous year (table B-69).

Production indexes

The duck brood index and average size were down for 1964, -69 percent and -4 percent, respectively; the goose brood index was down 63 percent from 1963, but average brood size was up 14 percent (table B-71).

The late nesting index was up for all species except the Canada goose (table B-71). This upward trend may have been caused by the late breakup this year. However, if this is the cause it seems strange that the goose late-nesting index was down, since even as late as August 1 many of the lakes in the northern part of the survey area were more than 50 percent ice covered.

BANDING AND RECOVERY DATA

RECOVERY RATES FROM 1963 PRE-HUNTING-SEASON BANDINGS OF MALLARDS AND BLACK DUCKS

Data supplied by R. Kahler Martinson
Division of Wildlife Research
Bureau of Sport Fisheries and Wildlife

INTRODUCTION

Pre-hunting-season banding of waterfowl provides data on the rate of band recovery which can be used to estimate rates of hunting kill. Band recovery rates can be examined to detect hunting pressure differences among age and sex cohorts within populations and/or the differences between populations. Several aspects of band recovery rates among mallards and black ducks have been discussed in U. S. Fish and Wildlife Service Special Scienti-

fic Report--Wildlife No. 60 (1959 and 1960 bandings), Migratory Bird Populations Station Administrative Reports 12 and 22 (1961 and 1962 bandings). The purpose of this report is to present the results of the 1963 pre-hunting-season banding program.

Cooperators in the 1963 pre-hunting-season banding program banded nearly 50 percent more mallards than they did in 1962. Important bandings in Saskatchewan by U. S. Game Management Agent E. M. Bosak and in Manitoba

by Flyway Biologist Morton Smith were responsible for much of the increase, but substantial numbers of birds were banded by the Minnesota Division of Game at Roseau River and by Bureau personnel at Shiawassee, Horicon, Agassiz, Upper Souris, Lower Souris, and other National Wildlife Refuges (table C-1).

The number of black ducks banded in 1963 was only slightly higher than in 1962. For the most part, bandings in 1963 were small and resulted in little usable data, but bandings from the States of Maine and New York were sizable and fair numbers of birds were banded in Ontario, Quebec, and Nova Scotia (table C-2).

Direct recovery rates from 1963 pre-hunting-season bandings of mallards and black ducks presented in this report were based on 100 or more banded birds. The numbers of banded birds used for calculating the rates in earlier years may be found in Special Scientific Report--Wildlife No. 60 and Administrative Reports 12 and 22.

MALLARDS

Recovery rates

The direct recovery rates of mallards banded in Pacific Flyway States showed no definite trend since 1962 (table C-3, p. 101). Recovery rates from six banding stations showed increases (among adult rates, three; immatures, three) while rates at seven banding sites decreased from 1962 (adults, four; immatures, three).

Among mallards banded in the Central Flyway, shooting mortality in 1963 appeared to be higher than in 1962. Direct recovery rates of adult mallards from five banding stations in Montana and the Dakotas increased markedly: the unweighted mean recovery rate in 1963 (4.2) for those stations was 150 percent higher than in 1962 (1.7). Recovery rates for immatures increased at all stations except Sand Lake National Wildlife Refuge in northeastern South Dakota. (Recovery rates for immatures banded at Sand Lake have been inconsistent with the rates for

the rest of the Flyway in other years also; for example, in 1962 the immature recovery rate increased while rates from all other banding stations decreased). The increase in the average recovery rate for immature mallards banded at those stations was over 100 percent, increasing from 2.4 in 1962 to 5.2 in 1963. Thus recovery rates for mallards banded in Central Flyway States increased significantly from 1962 and regained the level of rates that occurred in 1961 (table C-3).

Direct recovery rates of mallards banded in the Mississippi Flyway increased in 1963 but not to the extent of those in the Central Flyway. The unweighted average recovery rate for immature mallards from five comparable Mississippi Flyway stations was 7.4 in 1962 and 9.9 in 1963. The average rate for adults from three comparable stations increased from 4.2 in 1962 to 6.7 this year. These data suggest that kill rates for adult and for immature mallards in the Mississippi Flyway increased 60 and 34 percent, respectively.

Recovery data from mallard bandings in the Atlantic Flyway were too few to demonstrate any trend in kill rates. Comparable rates from banding stations in New York showed that rates from two stations decreased, one increased, and one was about the same as 1962.

Direct recovery rates of adult mallards banded in the Prairie Provinces of Canada showed a decline in 1963; rates of immature birds banded in that area showed a very slight increase from 1962. We might conclude that there was no change in the kill rates of mallards banded in Canada, but additional banding stations in Saskatchewan and Manitoba this year make the comparison with 1962 unreliable.

Not only have bandings in the Prairie Provinces been relatively small in recent years, but the locations of the banding stations have changed (hence, there is lack of comparability of data). One of the most apparent needs in the pre-hunting-season banding program is a series of well-distributed permanent

banding stations in Alberta, Saskatchewan, and Manitoba.

Relative recovery rates

The extent to which one banded sex or age cohort is more apt to be shot than another may be found by comparing recovery rates of the two. Table C-4 contains relative recovery rates determined by comparing the direct recovery rates of immature mallards with those of adults and expressed as immature per adult rates. The unweighted average relative recovery rate from 12 comparable stations was 1.6 in 1963 compared with 1.8 in 1962. (Because the data were highly variable, Pacific Flyway banding stations were not included). The average rate for seven comparable banding stations in the Central and Mississippi Flyways decreased from 2.1 in 1962 to 1.4 in 1963. These data suggest that immatures were less vulnerable during the 1963 hunting season than in 1962. However, the magnitude and distribution of bandings must be improved before we can obtain a precise measure of an average relative recovery rate.

Relative recovery rates based on adult and immature rates frequently vary from one harvest area to another (table C-5). Recovery data from four banding stations have been separated into three harvest areas generally extending from north to south. Recoveries of mallards banded at the Souris Refuges in North Dakota show that immature birds were relatively more vulnerable than adults in Canada, and northern and southern United States, but the two age groups were equally apt to be shot in central United States locations. The relative recovery rates of mallards banded at Agassiz National Wildlife Refuge in Minnesota showed that immatures were progressively less likely to be shot as they proceeded south; for example, their relative recovery rate was 2.91 in the north, 1.19 in the central States, and 0.33 in the south. The north-south variation in recovery rates between the Souris banding sites and the Agassiz banding station may be partially explained by the fact that both mallard populations contribute to the kill in the southern Mississippi Flyway but

birds from the Souris sites have not sustained as high shooting pressure in the north as those from Agassiz. Immature mallards banded at Horicon National Wildlife Refuge in Wisconsin appeared to be most vulnerable in the vicinity of the banding site (2.51 times as apt to be shot as adults in Wisconsin) but considerably less vulnerable (relative to adults) in the remainder of the Mississippi and the Atlantic Flyways. Relative recovery rates for mallards banded at Shiawassee National Wildlife Refuge in Michigan also indicated that the chances of shooting an immature bird in the south was less than that for an adult.

Relative recovery rates can be calculated for differences in the vulnerability between the sexes also (table C-6). Relative recovery rates, expressed as males per female, show that males are more likely to be shot than females in most areas. Recovery rates from one station, Monte Vista National Wildlife Refuge in Colorado, suggested that adult females were more vulnerable to the gun than adult males. Immature birds of both sexes banded at that station appeared equally apt to be shot. Banding sites such as Monte Vista and perhaps Ruby Lake are unique in that mallard populations are nearly resident in behaviour and recovery data from them typify only these relatively small populations. Recovery data from bandings of mallards in Minnesota indicated that males and females were probably about equally vulnerable in that region also. Immature mallards banded at Howlands Island in New York showed similar recovery rates for males and females while those at Pymatuning Reservoir in Pennsylvania revealed a greater vulnerability for females.

BLACK DUCKS

Recovery rates

Direct recovery rates for adult and immature black ducks appeared to have decreased somewhat in 1963 (table C-7). The unweighted mean recovery rate for adults from four comparable stations was 9.8 in 1962 and 8.2 this year. The average

direct recovery rate for immature black ducks was 10.1 in 1962 and 7.6 in 1963 from seven comparable stations. Direct recovery rates in 1963 were lowest from bandings at Moosehorn National Wildlife Refuge in Maine and highest from bandings in Ontario.

A temporary closure of hunting seasons because of fire hazard in the northern part of the Atlantic Flyway resulted in a generally later opening data for most of those States (8-14 days later). This could have caused a decrease in the kill rates of black ducks. However, the small number of bandings made it difficult to evaluate kill rates among black ducks.

Relative recovery rates

Relative recovery rates calculated for black ducks banded in most areas showed that immature birds were more likely to be shot than adults in 1963 (table C-8). However, bandings in Ontario showed that, among black ducks shot in the United States, adults were more apt to be shot than immatures. Recovery data from bandings at Parker River National Wildlife Refuge in Massachusetts suggested that adults were more likely to be shot than immature black ducks. The delay of the openings of the hunting seasons mentioned above may have been responsible for the typical relative recovery rate of black ducks banded at Parker River; for example, many of the immatures could have left before hunting seasons in adjacent States opened and thus were not subjected to the usual gunning pressure. In fact, the distributions of recoveries for immatures showed that about one-third of the immatures were shot south of New England in 1963, whereas all of the 1962 recoveries of immatures occurred in the northeast.

A good measure of the relative rate of recovery for adult and immature black ducks is of paramount importance in the understanding of age ratios in that species. Age ratios in the kill of black ducks have changed markedly in the past by recovery data suggest that some of the changes are due to changes in the relative vulnerability between adults and immatures. Therefore, it is very important that we have adequate

bandings for future evaluation of the population phenomena among black ducks.

Regional relative recovery rates for black ducks banded in the States of Maine and New York were calculated to investigate the variation in vulnerability between the age groups in the North and South (table C-9). Recovery data from Maine bandings showed that immatures were 1.40 times as apt to be shot as adults in the general latitude of Maine and north; this rate decreased to 1.16 south of Maine. Among black ducks banded in New York, immatures were nearly twice as likely to be shot as adults in New York and north, while they were only 0.73 times as vulnerable to the gun as adults south of the State in which banded.

DISCUSSION

The increase in direct recovery rates among mallards in the Central and Mississippi Flyways was concurrent with a general liberalization in the bag limit and season length in those Flyways. Although season lengths were increased but little in 1963, the daily bag limit for ducks was increased from two to four and the mallard limit from one to two. These liberalizations were expected to increase the kill of waterfowl. For the second consecutive year, recovery rates from mallards banded in Canada failed to change with a change in Federal regulations. However, comparisons of recovery data from Canadian bandings have thus far been of doubtful validity.

Relative recovery rates (immature: adult) for mallards seemed to be lower in 1963 than in 1962. This occurred because the increase in recovery rates for adults was greater than that for immatures in both the Central and Mississippi Flyways. It was suggested in Administrative Report 22 that high relative recovery rate of 1962 might have been a result of the short hunting season. The small bag limit may also have been a factor, and it could be speculated that the 1963 bag liberalization resulted in the lowered relative recovery rate this year. At any rate, regulation liberalizations could have influenced a change in the relative recovery rate by allowing a

higher rate of kill and by affecting a slightly higher proportionate kill in the

South where low relative recovery rates are characteristic.

PRESEASON BANDING AND RECOVERY RATES FOR BLUE-WINGED TEAL, 1962 AND 1963

Data supplied by R. Kahler Martinson
Division by Wildlife Research
Bureau of Sport Fisheries and Wildlife

The banding of blue-winged teal before the hunting season was stressed during 1962 and 1963, in Canada and in the Central and Mississippi Flyways because of interest in an experimental early hunting season designed to increase the harvest of this species. Pre-hunting-season bandings are necessary to measure the effects of such a hunting season on the rate of kill and to interpret the age and sex composition of the hunting kill. A few adult and immature blue-winged teal were banded during the pre-hunting-season period in 1962. In 1963 this banding program was expanded in the northern parts of the Central and Mississippi Flyways (table C-10). The bandings by many cooperators were lumped and show as regional or State totals.

The data show that direct (first hunting season) recovery rates for blue-winged teal are very low. Geis, Smith, and Goddard (1963, Administrative Report 18) noted that recovery rates for blue-winged teal were the lowest among the more common ducks in the bag. They found that direct recovery rates for blue-winged teal banded in the United States were higher than those for birds banded in Canada and, among Canadian bandings, blue-winged teal banded in Manitoba showed the highest recovery rates. The 1963 pre-hunting-season banding data for blue-winged teal seem to agree with those findings. In 1963, immature blue-winged teal banded in Minnesota and Iowa exhibited the highest recovery rates among all the adequate samples. The recovery rates for blue-winged teal banded in Manitoba were higher than the rates for teal banded in either Alberta or Saskatchewan.

Table C-11 contains a comparison of the direct recovery rates of blue-winged teal banded during 1963 with those available for 1961 and 1962. The data for 1963 do not show a definite trend from 1962. The unweighted mean direct recovery rate for adults in 1962 was 0.74 compared to 0.86 in 1963. The average recovery rate for immature blue-winged teal was 2.42 in 1962 and 2.14 in 1963. Thus it appeared that the kill rate for adults increased 16 percent in 1963, and that for immature blue-winged teal decreased 12 percent. However, these are rather fragmentary data from which to estimate kill rates and should be considered merely as a starting point for future banding of blue-winged teal during the pre-hunting-season period.

The low recovery rates of pre-hunting-season bandings of adult and immature blue-winged teal clearly demonstrate the need for relatively large banded samples to provide data for measuring rates of kill. This is particularly evident for adult birds which exhibit direct recovery rates of less than 1 percent from most bandings. The importance of large bandings of adults is accentuated when the migratory (and hence, kill) characteristics of adult males and females are considered. The fact that adult male blue-winged teal leave the breeding grounds earlier and appear to travel farther south than adult females seems to result in lower rates for hunting kill for the males. Hence, it is important to measure kill rates for both sexes among adults. These preliminary findings suggest that annual bandings of 1,000 each of adult males, adult females,

and immatures (sexes combined) may be necessary at most stations to evaluate the affects of special regulations on populations of blue-winged teal.

Although recovery data from the banding of flying birds provide the best measure of kill rates, we do have an impressive volume of recovery data from the banding of locals in many areas. For

example, it is now evident that kill rates for blue-winged teal banded as locals were higher during the early and mid-1950's than they have been since more restrictive regulations were enacted in the 1960's. Thus, in future years, data from the banding of locals will be important in analyzing the results of special seasons for blue-winged teal.

HARVEST DATA

COMPARISON OF HUNTERS' REPORTS AND SPY-BLIND OBSERVATIONS DURING 1961-62, 1962-63, AND 1963-64 HUNTING SEASONS

Data supplied by Samuel M. Carney and Glen Smart, Division of Wildlife Research, Bureau of Sport Fisheries and Wildlife

Objectives

This work was undertaken as a part of our studies to evaluate and improve the accuracy of mail surveys. The primary objective was to check the accuracy with which hunters participating in the duck wing collection survey report the time of day that they shoot each duck. Additional objectives were to determine the extent to which wings mailed by hunters are representative of the total bag, to estimate the proportion of their crippling loss hunters report in the mail questionnaire survey, and to learn whether the distribution of shots fired throughout the day reflects the distribution of the kill.

Procedure

During the 1961-62, 1962-63 and 1963-64 hunting seasons, field cooperators observed the actions of hunters from concealment and recorded them on special forms. The hunters were contacted in the field either immediately before or after the hunt. Those contacted before the hunt (5%) were given a supply of serially numbered envelopes equal to the number of hunters in the party or blind multiplied by the daily bag limit; those contacted after the hunt (95%) were interviewed and given a quantity of envelopes equal to the number of birds in their possession. Hunters

who disclosed that they had already received envelopes as part of the national duck wing collection survey were not given envelopes and were not included in this study. All "spy-blind" reports (439) and the respective duck wing envelopes were compared and analysed at the Migratory Bird Populations Station, Laurel, Md. Because findings from the 3 years appeared to be similar, the data were combined.

Results

During the 3 years of the study the hourly distribution of the observed kill of 889 birds could be compared with that reported by hunters. Hunter reports for these 889 birds were matched as nearly as possible with spy-blind observations for the same number of birds. Because hunters did not send wings from all birds they were observed to bag, it was necessary to omit some observed times. This comparison between field observations and hunters' reports showed considerable agreement (table D-1). To check on the possibility that a bias was introduced by omitting observations, the data obtained in 1961 were reexamined using all field observations. The results were so similar to the comparison made in 1961 that it was apparent the observed kills that were omitted had, in

the aggregate, the same distribution as those used in the comparison (fig. 1).

The difference in minutes between the reported and observed times of kill of the 889 birds is summarized in table D-2. Nearly one-half of the reports (49%) differed from the observations by less than 15 minutes, and only 18 percent by more than 1 hour. To check whether the omitting of observations had altered the comparison, the 1963 comparison was reexamined using only those forms for which hunters had reported the exact number of kills that were observed in the field. Here again, the results were similar to the comparison that had been made. The data indicate that although hunters may err in

reporting the time of day at which they kill a bird, most errors are small and tend to be compensating when viewed in the aggregate. The amount of agreement between reported and observed hour of kill is all the more noteworthy because 95 percent of the envelopes were distributed to the hunters after the hunt; thus the hunter had no prior notification to be aware of the time kills were made. The accuracy with which hunters report time of kill could be greater in the annual duck wing collection survey because all the hunters sampled receive envelopes with instructions before their first day's hunt.

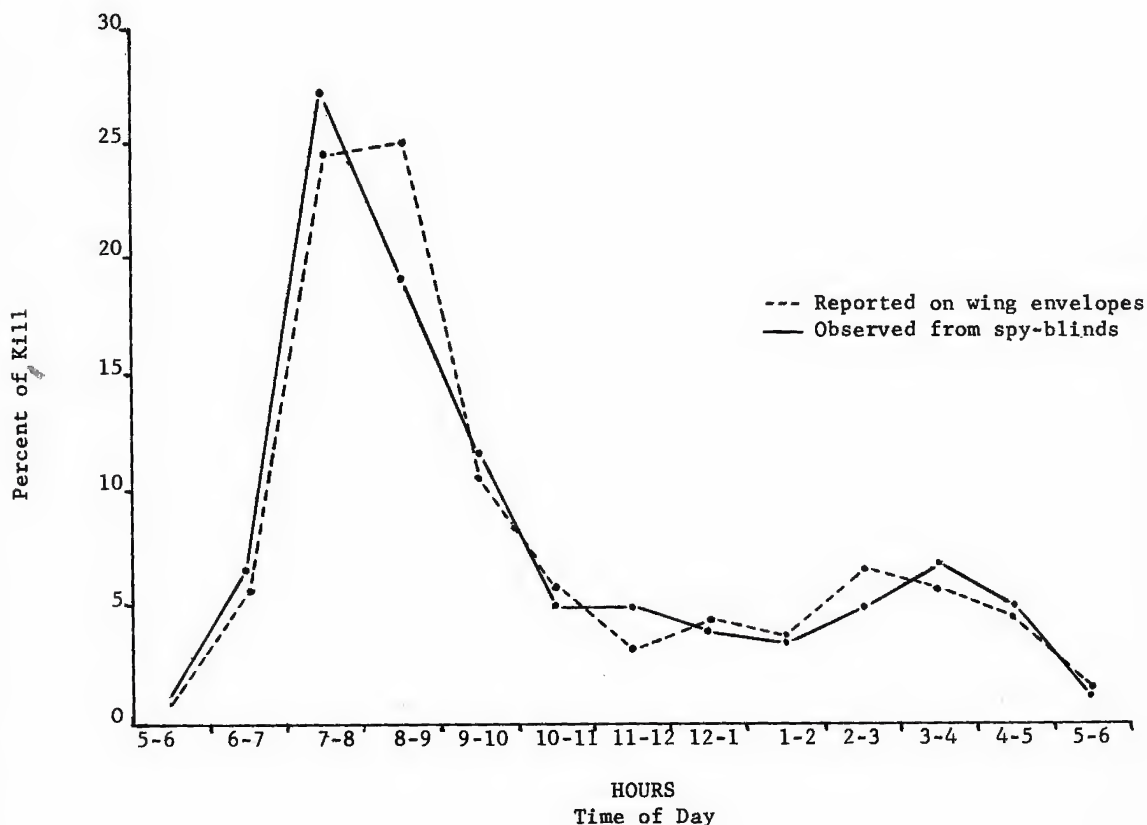


Figure 1. --Percentage comparison of 889 ducks killed by hours of day between hunter reports and spy-blind observations, 1961-62, 1962-63, and 1963-64 data combined.

The agreement between reported and observed time of kill indicates that the duck wing collection survey provides reliable information on the distribution of the kill within the day.

Spy-blind observers reported seeing 1,770 ducks bagged. Of the hunter groups given envelopes, 70 percent submitted wings from all or part of their bag. This represented 59 percent of the birds bagged. The reasons for nonresponse were examined but did not appear to be associated with hunting success or party size (table D-3). Although wings were not obtained from all birds known to have been bagged, we saw no evidence that the wings received were not a representative sample of the total bagged.

Before field work, the following terms were defined in order to maintain uniformity among the observers:

"Knocked down," those birds that fell immediately when shot.

"Sailers," birds obviously hit as evidenced by the fact that their normal flight characteristics were altered. This category did not include birds that merely lost feathers (some of which may have been cripples).

"Hits," the sum of those birds which were either knocked down or sailers.

"Bagged," only those birds hit and retrieved.

"Cripples," the difference between birds hit and birds bagged.

Field observers recorded a ratio of 0.47 cripples per bird bagged (table D-4). Hunters interviewed immediately following the hunt, however, reported only 55 percent of these cripples or 0.26 cripples per bird bagged (table D-5). A review of crippling losses reported by hunters for a 3 year period (1961-62, 1962-63, and 1963-64) through the mail questionnaire survey indicated that 0.25 birds were lost for every bird bagged. Despite the differences in the methods used to sample

"cripples," the fact that hunters contacted during studies reported similar ratio of cripples to birds bagged suggests that cripples may be underreported on the questionnaire survey also.

Field observations indicated that 10,272 shots were fired to bag 1,770 birds. The relation between shots fired and birds bagged throughout the day has been summarized by hour of the day in relation to either sunrise or sunset (table D-6). These data suggest that fewer shots may be required to kill a bird before sunrise and more shots near midday and that the ratio of cripples lost to birds bagged may be highest near midday. There was great variation among individual observations of cripples lost and shots fired to bird bagged, and the sample sizes associated with hours of the day were small. For these reasons differences among the ratios could have been by chance and no conclusions should be drawn at this time.

Future spy-blind needs

In the 3 years' data we have seen no pattern of hunter response that might cause the sample of wings obtained not to be representative of the total kill of these hunters. Because this report indicates that the duck wing collection is now providing reliable information on the distribution of the kill within the day, future spy-blind studies need not include the distribution of the envelopes.

The largest unknown quantity remaining is the magnitude of crippling loss. Future spy-blind studies should concentrate upon gathering information that would lead to a better understanding of crippling loss. Field cooperators can also obtain information relating to hunters' abilities to recognize bonus birds and species that are partially or completely protected.

WATERFOWL KILL SURVEY

Data supplied by M. Edwin Rosasco and Elwood M. Martin,
Bureau of Sport Fisheries and Wildlife

Scope and methods

Each year, immediately after the hunting season, the Bureau of Sport Fisheries and Wildlife conducts a national mail questionnaire survey of waterfowl hunters designed to meet the following objectives:

1. Estimate, at both flyway and State levels, the magnitude of the waterfowl harvest, the total number of hunters active during the season, the total number of hunter-days afield amassed by these hunters, and the average seasonal performance per hunter in terms of days hunted and waterfowl bagged.
2. Measure the relative changes in these estimates from year to year.
3. Assess the effects of changes in season length and size of daily bag limit on total bag and on hunter performance.

The 1963-64 hunting season marks the 12th consecutive year of the survey since its start in 1952.

Since there is no complete listing of waterfowl hunters, this survey, by necessity, uses as its sampling universe those post offices throughout the nation which sell Migratory Bird Hunting Stamps ("duck stamps"). This year, 2,736 post offices were designated to cooperate in the survey as "sample outlets." These sample outlets were randomly selected, within States, from four strata (small, medium, large, and very large) of post offices, based on actual dollar sales of duck stamps instead of from two strata (single, multiple) as in previous years. A further refinement in stratification was used--that of subdividing each State into several "geographic zones", while retaining the post office class strata within each zone. This year the geographic zoning of a number of States was revised from that of last year in an effort to make each zone a more uniform unit in regard to waterfowl hunter activity and success, thus increasing survey precision. Zoning also insures a more even distribution of sample outlets throughout a State.

Names and addresses of hunters are obtained by means of a business-reply "contact card" distributed to all persons buying duck stamps at sample outlets.

The card requests the individual's name and address, the number of stamps he purchases, the reason for his purchase, and the number of persons in his household under the stamp requirement age of 16 years who might hunt waterfowl during the season.

All contact-card respondents who purchase stamps for the purpose of hunting are mailed a hunter questionnaire at the close of the season. The 1963-64 questionnaire asks each hunter the total number of days he hunted waterfowl, his total bags of ducks, geese, and coots, and the number of each he knocked down but failed to retrieve. These data, in combination with the total reported sale of duck stamps by State, have been used to derive the various survey estimates.

All estimates are subject to several sources of error (as is true for most types of surveys). In addition to chance error due to random sampling variation, the estimates may be affected by misreporting (respondents may tend, for example, to exaggerate their bag). The estimates are further subject to non-response bias in that hunters who fail to respond may have differed from respondents in their hunting performance.

A further potential source of error, that of faulty reports of duck stamp sales, this year has again presented a problem, although not as serious as that of last year. Since it is necessary to present kill estimates no later than early July to be available for regulations meetings, the reported sales for the first three quarters of the fiscal year (July 1 to March 31) must be used in deriving total kill and activity estimates instead of the full year's sales (the sales for the last quarter of the fiscal year are not available until Mid-August). Before 1959, the three-quarter-year reports were generally identical to those for the full year, but since that time, a small but increasing percentage of sales have been reported during the fourth fiscal quarter (April 1 to June 30). Last year it became apparent, because of the magnitude of the fourth-quarter sales reports of many States, that the three-quarter

sales reports were definitely incomplete. Measures to correct this reporting lag were negotiated with the Post Office Department, and a substantial improvement in reporting has been noticed this year.

Because of some still-remaining incompleteness of the three-quarter fiscal year reports of certain States (especially Massachusetts, West Virginia, and Virginia), it was necessary to recompute parts of the 1963 analysis. The revised estimates, based on the full year's stamp sales, are presented in this report.

The 1962 estimates presented here for comparison with the revised 1963 estimates have also been recalculated utilizing the same stratification system used for the 1963 data and on the basis of full year's stamp sales.

As in each year since 1960, the flyway bag estimates for ducks, geese, and coots were adjusted for response bias in reported figures by using the correction factors calculated in that year. The hunting activity and bag of "junior hunters" have again been estimated by the use of expansion factors based on findings in previous years. The species composition of the duck and goose harvest is based on the results of the annual Duck Wing and Goose Tail Collection Surveys.

Previously, geographic zones were used mainly for the selection of sample outlets for the survey. This year, for the first time, they, together with the post office strata, have been used in the analysis of the data as well. This increase in number of strata used in sampling and in the analysis of data was made possible through the use of computer methods. Computer calculations were done entirely by the Migratory Bird Populations Station Machine Data Processing Unit.

The 1963 estimates have been derived from the responses of approximately 55,530 hunters contacted throughout 2,736 post offices (table D-7).

Pacific Flyway

An estimated 2,741,500 ducks were bagged in the Pacific Flyway during the 1963-64 waterfowl season, an increase of 45 percent over the previous season

(table D-8). An additional 545,500 ducks were knocked down but not retrieved, for a total kill (bag plus cripples) of approximately 3,286,900 ducks. All States registered increases in the total duck bag as compared to the previous season.

Analysis of the total Flyway duck bag by species, as derived from data provided by the Duck Wing Survey, shows that the bags of five species--mallard (843,900), pintail (585,800), green-winged teal (376,300), American widgeon (324,400), and shoveler (256,900)--totaled 2,387,300 ducks or 87 percent of the Flyway bag of all species. The bags of most species of ducks increased, except for greater scaup, mergansers, and scoters, all of which showed decreases.

The total Flyway goose bag of an estimated 328,900 birds increased 54 percent over the previous season. An additional 64,500 geese were knocked down but not retrieved, for a total kill (bag plus cripples) of approximately 393,400 geese (table D-9). All States registered increases in the total goose kill except Arizona (-16%).

An estimated 72,000 coots were bagged in the Flyway, an increase of 7 percent over the previous season. An additional 52,300 coots were knocked down but not retrieved, yielding a total kill (bag plus cripples) of about 124,300 coots.

A total of approximately 268,020 waterfowl hunters were afield during an estimated 1,992,500 hunter-days (table D-10), registering a 12 percent increase in the number of active hunters and a 15 percent increase in total hunter-days over the previous season.

Central Flyway

An estimated 1,078,600 ducks were bagged in the Central Flyway during the 1963-64 waterfowl season, an increase of 130 percent over the previous season (table D-11). An additional 264,800 ducks were knocked down but not retrieved, for a total kill (bag plus cripples) of approximately 1,343,500 ducks.

Analysis of the total Flyway duck bag by species, as derived from data provided by the Duck Wing Survey, shows that the bag of mallards (457,400) comprised 42 percent of the total bag of all species. The bags of green-winged teal (125,200), gadwall (116,300), pintail (102,900), and American widgeon (80,900), together with mallards, comprised 82 percent of the Flyway bag of all ducks. The bags of most species of ducks showed substantial increases over those of the previous year.

The total Flyway goose bag of an estimated 264,800 birds increased 37 percent over the previous season. An additional 46,700 geese were knocked down but not retrieved, for a total kill (bag plus cripples) of approximately 311,500 geese (table D-12). All States registered increases in the total goose bag as compared to the previous season, except Montana (-15%).

An estimated 22,700 coots were bagged in the Flyway, an increase of 125 percent over the previous season. An additional 10,300 coots were knocked down but not retrieved yielding a total kill (bag plus cripples) of about 33,000 coots (table D-13).

All States registered substantial increases in the total duck bag, due both to increases in the mean kill of ducks per hunter and in numbers of active hunters. A total of approximately 227,750 waterfowl hunters were active during an estimated 1,471,600 hunter-days, registering increases of 42 and 43 percent, respectively, over the previous season.

Mississippi Flyway

An estimated 2,519,800 ducks were bagged in the Mississippi Flyway during the 1963-64 waterfowl season, an increase of 123 percent over the previous season (table D-14). An additional 689,500 ducks were knocked down but not retrieved, for a total kill (bag plus cripples) of approximately 3,209,400 ducks.

Analysis of the total Flyway duck bag, by species, as derived from data provided by the Duck Wing Survey, shows that the bags of nine species—mallard (925,500), wood duck (372,300), blue-

winged teal (197,800), lesser scaup (189,100), green-winged teal (164,100), ringnecked duck (123,300), American widgeon (118,300), gadwall (109,100), and pintail (108,700)—totaled 2,308,200 ducks or 91 percent of the Flyway bag of all species. The bags of most species of ducks showed substantial increases, except that the bag of greater scaup showed very little change (+2%) over the previous year.

The total Flyway goose bag of an estimated 180,700 birds increased 44 percent over that of the previous season. An additional 35,700 geese were knocked down but not retrieved, for a total kill (bag plus cripples) of approximately 216,400 geese (table D-15). All States registered increases in the goose kill except Ohio (-4%), Alabama (-7%), and Indiana (-49%).

An estimated 225,900 coots were bagged in the Flyway, an increase of 180 percent over that of the previous season. An additional 61,900 coots were knocked down but not retrieved yielding a total kill (bag plus cripples) of about 287,800 coots.

All States registered substantial increases in the total duck bag. The increases were usually due both to an increase in active hunters and an increase in the mean duck kill per hunter. A total of approximately 497,610 waterfowl hunters were afield during an estimated 3,141,500 hunter-days, registering increases of 39 and 46 percent, respectively, over the previous season (table D-16).

Atlantic Flyway

An estimated 889,100 ducks were bagged in the Atlantic Flyway during the 1963-64 waterfowl season, an increase of 22 percent over the previous season (table D-17). An additional 220,400 ducks were knocked down but not retrieved, yielding a total kill (bag plus cripples) of approximately 1,109,500 ducks.

Analysis of the total Flyway duck bag by species, as derived from data provided by the Duck Wing Survey, shows

that the bags of five species--black ducks (217, 900), mallards (140, 900), wood ducks (125, 000), ring-necked ducks (68, 600), and green-winged teal (61, 800)--totaled 614, 200 ducks or 69 percent of the Flyway bag of all species. The bags of most species of ducks increased. The bag of greater scaup decreased 13 percent, whereas the bag of old squaw and eider decreased 32 percent and the bag of scoters decreased 17 percent.

The total Flyway goose bag of an estimated 161, 000 birds increased 42 percent over the previous season. An additional 27, 300 geese were knocked down but not retrieved, for a total kill (bag plus cripples) of approximately 188, 300 geese (table D-18). All States registered increases in the goose bag except Connecticut, Florida, Massachusetts, and West Virginia, which decreased, and

Rhode Island, which showed no change over the previous season (table D-18).

An estimated 47, 300 coots were bagged in the Flyway, an increase of 25 percent over the previous season. An additional 15, 700 coots were knocked down but not retrieved, yielding a total kill (bag plus cripples) of about 63, 000 coots.

At the State level, 11 States registered increases in the total duck bag, whereas 6 States registered decreases. The kill in Georgia increased 137 percent over the previous season owing to an 84 percent increase in the number of active hunters and an increase in the mean kill of ducks per hunter (table D-19).

A total of approximately 211, 100 waterfowl hunters were afield during a total of 1, 275, 900 hunter-days, registering increases of 11 and 10 percent, respectively, over the previous season.

AGE RATIOS OF SOME IMPORTANT SPECIES OF DUCKS KILLED DURING 1963-64 HUNTING SEASON COMPARED WITH THOSE OF PRIOR YEARS

Data supplied by Glen Smart
Division of Wildlife Research
Bureau of Sport Fisheries and Wildlife

Abstract

The ratio of immature to adult ducks in the hunting kill of mallards, black ducks, blue-winged teal, pintails, and wood ducks are presented for the years 1961 through 1963. There was a general increase in the 1963 age ratios of these species above those in 1962. Although Central Flyway mallard age ratios increased, they were lowest in the Nation for the third consecutive year. Of all the species discussed, blue-winged teal age ratios showed the largest continentwide increase. Except for mallards in the Pacific Flyway, age ratios in the kill of all species were higher in the northern parts of the Flyways.

To determine the age ratio in the pre-season population, it is necessary to use recovery rates from preseason bandings to measure the extent to which immatures were more likely to be shot than adults. When the age ratio in the kill is adjusted

for difference in vulnerability, the age ratio in the preseason continental mallard population was 0.8 immatures to adult in 1962 and 1.0 in 1963, while the age ratio in the 1963 preseason pintail population was about 0.8 immatures to adult.

Introduction

The age ratios (immature to adult) in the duck kill discussed here were determined from wings received in the wing collection surveys conducted in the Mississippi and Atlantic Flyways since 1960 and in all Flyways since 1961. In order to estimate the age ratio in the kill for a Flyway, or for the entire United States, the age ratio from each State was weighted in proportion to the kill in that State as derived from the results of the Bureau's mail questionnaire survey. Weighted age ratios for 1962 are subject to some revision since revised kill

estimates are contemplated for that year.

Mallard age ratios

Age ratio of mallards killed in the Atlantic Flyway during the 1963-64 hunting season, showed a slight increase but is still substantially lower than the ratio obtained in 1960-61. The birds killed in Pennsylvania and other more northern States in the Atlantic Flyway showed a higher ratio of immature to adult (2.53) than did the States south of Pennsylvania (1.25).

The ratio of immature to adult mallards killed in the Mississippi Flyway during the 1963 hunting season (1.30) showed a slight decline from the ratio observed in 1962 (1.40), particularly in the northern part of the Flyway. Age ratios in the southern half of the Flyway tended to rise slightly or remained relatively unchanged.

Although steadily increasing since 1961, the Central Flyway mallard age ratio was still the lowest in the Nation for the third consecutive year. The observed ratio in the kill was 0.69 in 1961, compared with 0.94 in 1962 and 1.03 in 1963.

In the Central Flyway States of Montana, Wyoming, and Colorado, the wing survey data were segregated by counties east and west of the Continental Divide because those counties east of the Continental Divide were subject to regulations of the Central Flyway, and those counties west of the Divide were governed by Pacific Flyway regulations. New Mexico was not divided in this manner because the Continental Divide does not follow county lines.

In Montana the age ratio in 1963 was much higher west of the Divide than east. Conversely, in Wyoming and Colorado mallard age ratios west of the Divide were relatively low and only slightly higher than east of the Divide.

The mallard age ratio in the Pacific Flyway kill increased from 1.25 immatures to adult in 1962 to 1.62 in 1963. This represents a gain of 30 percent over 1962.

In the 3 years that wing collection survey data have been available for all Flyways, the continental weighted age ratio of mallards has shown a steady increase from 1.05 immatures to adult in 1961 to 1.36 immatures to adult in 1963 (table D-20).

In order to determine the age composition of the preseason population, it is necessary to correct the age ratios observed in the kill for the greater vulnerability of immatures to hunting. The preseason banding data presented in Administrative Report 46 were examined to determine the extent to which recovery rates from immatures taken in the United States exceeded recovery rates from adults. The recovery rates from each area were weighted in approximate proportion to the importance of the size of the population it represents and the Flyway or Flyways to which its recoveries relate. Although this approach should yield average relative recovery rates that are more representative than the unweighted averages presented in past reports, it places a great deal of weight on the meager and uncomparable preseason bandings in the Prairie Provinces of Canada. In fact, preseason bandings in Canada in 1962 were so few that it was necessary to assume that the data from 1963 also reflected the characteristics of the kill in 1962. Thus, by giving each banding station equal weight, as has been necessary in the past owing to a lack of information from Canada, estimates of relative recovery rates may be biased. The 1963 preseason bandings in Canada for the first time were sufficient to illustrate the advisability of recognizing that mallards banded in Canada have different kill rate characteristics than those banded in the United States.

A study is in progress to develop appropriate weighting procedures, but the results are not yet available. A preliminary summation of the data indicates that in 1962 immatures were about 1.4 times more likely to be shot than adults and in 1963 they were 1.3 times more likely to be taken. It is believed that the

estimate of relative recovery rate in 1962 is too low because of inadequate and unrepresentative Canadian bandings that year. It is estimated, on the basis of banding stations in the United States (Administrative Report 46), that the actual relative recovery rate is probably between 1.4 and 1.8. If it is assumed that the actual rate is intermediate between these values (1.6), the age composition of the mallard population was 0.8 immature to adult in 1962 and 1.0 immature to adult in 1963. This is a substantial improvement but it still does not reflect a production ratio characteristic of a rapid rate of increase in the population.

Black duck age ratios

The observed black duck age ratios in the Atlantic Flyway kill were higher in 1963 than in 1962. In 1962, there was an observed age ratio of 1.32 immatures to adult, while in 1963, it was 1.51. The highest age ratios were in the New England States and lowest in the southern part of the Flyway.

In the Mississippi Flyway, there was a continued decrease in the age ratio in the black duck kill. The ratios declined from a high of 2.04 in 1961, to the present low of 1.11 immatures to adult. There was a progressive decrease in age ratios from north to south among those States where estimates were made. The continental age ratio of black ducks showed little change from 1962 (table D-21).

Adequate preseason banding data are essential in order to interpret black duck age ratios in the kill. As pointed out in Administrative Report 27, there is a strong suggestion that the annual variation shown in the age composition of the kill in the past may have been caused by changes in differential vulnerability. Black duck preseason banding data are too meager to allow an estimate of the age composition of the population with any precision. Again, there is a suggestion that the improvement in the age ratio in the kill shown in the Atlantic Flyway was due, at least to some extent, to a change

in differential vulnerability. Comparable banding stations in this Flyway indicate that the relative recovery rate in 1963 was higher than that in 1962. Thus, the improved age ratios in the Atlantic Flyway may reflect increase in the likelihood of immatures being shot rather than improvement in the age composition of the preseason population.

Blue-winged teal age ratios

Because of the current interest in the blue-winged teal in the Mississippi and Central Flyways, only those two Flyways were tabulated. The other two Flyways were used only in the computation of weighted ratios for the entire United States.

In the Mississippi Flyway, the ratio of immature to adult blue-winged teal increased 90 percent from 1962 to 1963 (1.65 to 3.13). The ratio of immatures to adults increased 153 percent in Minnesota and 136 percent in Michigan.

Age ratios are shown for those States in the Central Flyway from which a sample of 20 or more wings were obtained. The Flyway weighted average increased from 2.11 in 1962 to 2.69 in 1963. The combined weighted age ratio for the Mississippi and Central Flyways increased from 1.24 in 1962 to 3.04 in 1963 (table D-22).

The blue-winged teal and cinnamon teal could not be separated by wing characters and were combined for the purpose of calculating a continental weighted age ratio. The 1963 observed ratio in the continental kill was 2.41 immatures to adult as compared with 1.40 for 1962. This represents an increase of 72 percent.

Despite the large number of blue-winged teal banded preseason in 1963, recovery rates were so low that harvest rates for immatures and adults could not be measured with sufficient precision to accurately determine the age composition of the preseason population. For example, the preseason banding data suggest that immatures were over four times more likely to be taken than adults. This implies an age ratio in the

preseason population of only 0.6 immature to adult, which is unreasonably low in view of apparent blue-winged teal population trends.

Pintail age ratios

The pintail is a major game species only in the three western Flyways. Moderate increases were observed in all three Flyways. The greatest number of immatures to adult was found in the northern parts of all three Flyways. In California, where more pintails are harvested than in any other State, the age ratio in the kill was 1.1 immatures to adult in 1963, which was similar to the 1962 ratio of 1.0 (table D-23).

The continental weighted age ratio has increased steadily from 0.76 in 1961, to 1.29 in 1963 (an increase of 70 percent). Preseason banding data for pintails are extremely spotty. In California, they indicate that immature pintails were 1.5 times more likely to be taken in California than adults. This suggests that for this important area the age composition of the preseason population was only 0.7 immature to adult. South Dakota bandings

revealed that immatures were 1.75 times more likely to be taken than adults. This banding station relates to recoveries largely in the Central Flyway and indicates that the 1.4 immatures to adult age ratio observed in the Central Flyway kill represents a ratio of only 0.8 immature to adult in the preseason population.

Wood duck age ratios

Wood duck age ratios showed an upward trend in 1963 (table D-24). The increase was greater in the Mississippi Flyway (1.25 in 1962 and 1.81 in 1963) than in the Atlantic Flyway (1.29 in 1962 and 1.48 in 1963).

The preseason banding program for wood duck is on a relatively larger scale than for any other species. The recovery rates indicate that in 1963 immatures were 1.2 times more likely to be taken than adults, while in 1962 the vulnerability ratio was 1.3 (Administrative Report 51). This suggests that the proportion of the preseason population consisting of immatures increased slightly more than indicated by the age composition in the kill.

RESULTS OF GOOSE TAIL COLLECTION SURVEY, 1962 AND 1963 HUNTING SEASONS

Data supplied by Alfred J. Godin and Aelred D. Geis
Division of Wildlife Research
Bureau of Sport Fisheries and Wildlife

In 1962, a goose tail collection survey was inaugurated to measure the species and the age composition of the goose kill throughout the United States. Hunters indicating that they shot 1 or more geese in the previous year's mail questionnaire survey were sent 10 goose tail collection envelopes. In addition, to gain insight into the extent of the goose kill by other waterfowl hunters who had not reported geese the previous year, 1,970 Wisconsin duck hunters were sent supplies of goose tail collection envelopes in 1963. In 1962, a total of 7,459 hunters who were sent goose tail collection envelopes returned 5,250 tails, while in 1963, 9,724 hunters

sent 7,353 tails. The sample of duck hunters contacted in Wisconsin who had not shot a goose the previous year returned goose tails at 26 percent of the rate of previously successful goose hunters. This indicates that a significant goose kill is made by duck hunters who do not regularly take geese.

Species was determined from the color, size, and shape of the tail feathers. Preliminary data suggest that Canada geese may be further segregated into size groups and flocks based on tail measurements and/or the geographic area in which they were taken. For this report it is necessary to combine all Canada

goose data from a State. Age determinations were based on presence or absence of notched, blunt-tipped tail feathers. Data presented in this report are the result of pooling data from each State with no recognition of differences in sampling intensity that may exist among parts of a State. The information presented herein may be changed slightly when a more detailed analysis, recognizing variation within States, is completed. (Table D-25).

The Canada goose is the most important species in the bag in all States and Flyways, with the exception of South Dakota, Minnesota, Iowa, Louisiana, and Texas, where a combination of lesser snow and blue geese predominate, and New Jersey, where the brant is by far the most important goose in the bag.

Goose age ratios

Canada goose age ratios showed no consistent trend (table D-26.) Lesser snow geese in all Central Flyway States showed a consistent increase in 1963 compared with 1962 in the ratio of immatures to adult, while in California there was little change. Blue goose age ratios showed no particular pattern of change. White-fronted goose age ratios in California were substantially lower in 1963 than 1962; a slight decline was suggested by the Texas sample. Black brant on the Pacific Coast showed a marked drop in the proportion of young birds in the bag in 1963 compared with 1962; brant on the Atlantic Coast showed a pronounced increase (table D-27).

APPENDIX

A. WATERFOWL WINTER SURVEY TABLES

TABLE A-1. --Number of birds observed, North America extended, winter survey, 1964 and 1963

Species	1964	1963	Percent change	14-year average	Percent change
Ducks:					
Dabblers:					
Mallard -----	8,708,021	7,287,513	+ 19.5	7,407,947	+ 17.5
Black duck -----	584,529	485,814	+ 20.3	545,631	+ 7.0
Mottled duck -----	99,730	44,530	+124	25,697	+288.0
Gadwall -----	1,356,374	633,550	+114	547,877	+147.0
American widgeon --	2,031,017	1,785,239	+ 13.7	1,686,524	+ 20.4
Green-winged teal --	2,268,464	1,262,229	+ 79.7	1,092,700	+108.0
Blue-winged teal ---	778,927	402,275	+ 93.6	401,211	+ 94.0
Cinnamon teal -----	7,730	4,969	+ 55.6	--	--
Shoveler -----	832,953	849,347	- 2.0	746,898	+ 11.5
Pintail -----	4,694,530	3,586,231	+ 31.0	4,105,331	+ 14.3
Wood duck -----	--	60,268	--	--	--
Tree duck -----	70,692	73,259	- 3.5	59,340	+ 19.0
Subtotal -----	21,432,967	16,475,224	+ 30.0	16,727,729	+ 28.0
Divers:					
Redhead -----	805,956	593,081	+ 35.9	708,987	+ 13.6
Canvasback -----	336,866	330,329	+ 2	358,420	- 6.0
Scaup -----	1,998,206	3,049,403	- 34.5	2,579,180	- 22.6
Ring-necked duck -----	341,734	286,755	+ 19.2	258,382	+ 32.2
Goldeneye -----	188,432	205,119	- 8.1	211,087	- 10.8
Bufflehead -----	65,184	79,494	- 18	82,688	- 21.2
Ruddy duck -----	257,692	286,812	- 10.2	264,719	- 2.7
Subtotal -----	3,994,070	4,830,993		4,463,463	
Miscellaneous:					
Eider -----	63,900	117,167	- 45.5	59,641	+ 7.1
Scoter -----	118,375	187,007	- 36.7	228,458	- 48.2
Oldsquaw -----	6,425	30,641	- 79	29,159	- 78.0
Merganser -----	238,672	239,676	- 0.4	226,051	+ 5.5
Subtotal -----	427,372	574,491		543,309	
Unidentified -----	438,106	480,935	- 8.9	528,391	- 17.1
Total ducks -----	26,292,515	22,361,643	+ 17.6	22,262,781	+ 18.1
Geese:					
Snow goose -----	889,915	1,022,173	- 13	912,563	- 2.5
Blue goose -----	411,521	373,180	+ 10.3	389,694	+ 5.6
Ross' goose -----	32,450	25,253	+ 28.5	14,623	+221.9
White-fronted goose ---	270,964	219,382	+ 23.5	223,805	+ 21.0
Canada goose -----	1,423,093	1,326,598	+ 7.3	1,179,220	+ 20.6
Cackling goose -----	108,995	238,327	- 54.3	219,478	- 50.4
Total geese -----	3,136,938	3,204,913	- 2.1	2,941,255	+ 6.6
Brant, Pacific -----	185,287	140,025	+ 32.3		
Brant, Atlantic -----	182,900	167,405	+ 9.2		
Total brant -----	368,187	307,430			
Swans:					
Whistling swan -----	91,894	108,240	- 15	93,628	- 1.9
Trumpeter swan -----	578	611	- 5.4	807	- 28.4
Total swans -----	92,472	108,851		94,435	
Coots -----	2,636,814	1,810,243	+ 45.7	2,074,811	+ 27.0
Grand total -----	32,526,926	27,793,080	+ 17	27,681,498	+ 17.5

TABLE A-2. --Number of birds observed, by species, Pacific Flyway extended, winter survey, 1963 and 1964

Species	1963		1964		Percent change
	Number	Percent	Number	Percent	
Ducks:					
Dabblers:					
Mallard -----	2,642,011	26.3	2,060,859	21.6	- 21.9
Gadwall -----	126,869	1.2	72,544	0.8	- 42.8
American widgeon --	1,162,713	11.5	959,746	10.0	- 17.4
Green-winged teal --	418,703	4.1	637,971	6.7	+ 52.3
Blue-winged and cinnamon teal ----	89,569	0.8	181,238	1.9	+105.2
Shoveler -----	497,319	4.9	379,619	4.0	- 24.6
Pintail -----	2,072,821	20.6	2,389,555	25.1	+ 15.2
Wood duck -----	1,185	Trace	1,088	Trace	--
Tree duck -----	40,545	0.4	41,550	0.4	+ 2.5
Subtotal -----	7,051,735	69.8	6,724,170	70.5	- 4.7
Divers:					
Redhead -----	45,406	0.4	52,700	0.5	+ 16.0
Canvasback -----	100,824	1.0	80,778	0.8	- 19.8
Scaup -----	437,285	4.3	279,919	2.9	- 36.0
Ring-necked duck -----	7,220	Trace	9,891	0.1	+ 36.9
Goldeneye -----	59,953	0.5	59,285	0.6	- 1.1
Bufflehead -----	34,438	1.9	25,911	0.3	- 24.7
Ruddy duck -----	193,229	1.9	159,202	1.8	- 17.6
Subtotal -----	878,355	8.4	667,686	7.0	- 2.4
Miscellaneous:					
Eider and scoter -----	103,251	1.0	79,972	0.8	- 22.5
Oldsquaw -----	300	Trace	330	Trace	+ 10.0
Merganser -----	36,074	0.3	24,567	0.3	- 31.8
Subtotal -----	139,625	1.3	104,869	1.1	- 24.9
Unidentified -----	92,768	0.9	75,285	0.7	
Total ducks -----	8,162,483	82.2	7,572,010	79.5	- 7.2
Geese:					
Snow goose -----	482,911	4.8	453,891	4.8	- 6.0
Ross' goose -----	25,253	0.2	32,450	0.3	+ 28.5
White-fronted goose ---	128,566	1.3	171,756	1.7	+ 33.6
Canada goose -----	206,257	2.0	217,639	2.3	+ 5.5
Cackling goose -----	238,327	2.4	108,995	1.2	- 54.3
Total geese -----	1,081,314	10.7	984,731	10.3	- 9.0
Black brant -----	140,025	1.4	185,287	2.0	+ 35.9
Swans:					
Whistling swan -----	46,772	0.5	29,572	0.3	- 36.8
Trumpeter swan -----	170	Trace	274	Trace	+ 61.1
Total swans -----	46,942	0.5	29,846	0.3	- 36.4
Coots -----	605,103	6.0	754,824	7.9	+ 24.7
Grand total -----	10,035,867	100.0	9,526,698	100.0	- 5.1

TABLE A-3. --Distribution of wintering waterfowl,
Pacific Flyway extended, 1963 and 1964

[Index numbers]		
Area	1963	1964
British Columbia -----	71,580	--
Washington -----	1,511,001	1,538,853
Oregon -----	579,074	474,442
California -----	5,069,655	4,813,514
Idaho -----	1,071,281	516,783
Nevada -----	45,923	173,084
Utah -----	103,588	58,406
Arizona -----	74,519	67,269
Montana: West -----	33,294	38,240
Colorado: West -----	6,805	14,872
New Mexico: West -----	3,333	1,095
Wyoming: West -----	3,210	8,405
Mexico: West coast -----	1,462,604	1,821,735
Total -----	10,035,867	9,526,698

TABLE A-4. --Trend in waterfowl numbers, Pacific Flyway extended,
winter survey, 1949 to 1964

[In thousands]

Year	Ducks	Geese	Brant	Swans	Coots	Total
1949-----	9,008	980	123	17	773	10,901
1950-----	7,082	730	144	18	407	8,381
1951-----	6,619	1,000 ¹	151	33	769	8,572
1952-----	6,646	917	167	20	520	8,270
1953-----	7,352	952	154	29	796	9,283
1954-----	7,813	884	132	28	1,169	10,026
1955-----	7,288	872	135	36	717	9,048
1956-----	7,929	961	110	48	885	9,933
1957-----	6,593 ²	749	128	44	952	8,466
1958-----	8,582	800	126	51	815	10,394
1959-----	9,452	918	68	40	1,007	11,485
1960-----	7,760	883	105	36	859	9,643
1961-----	7,780	1,100	134	41	1,162	10,217
1962-----	7,365	1,223	170	34	703	9,495
1963-----	8,162	1,081	140	47	605	10,036
1964-----	7,572	985	185	30	755	9,527

Note, --Coverage during the period was not comparable and the data were adjusted, using 1959 and 1955 as base years. It was assumed that areas where comparable surveys were conducted provided an accurate measure of the percentage change between 2 consecutive years. On this basis, population estimates were calculated backward and forward from the base years. The 1962 figures are based upon only observed birds and are not adjusted.

¹Index arbitrarily reduced from 1,797,000 to 1 million geese. During January 1951, more geese were estimated to be in Merced County, California, than were in the entire Flyway either the previous or the following year. It seems certain that the estimate was in error. If the geese recorded in Merced County are deleted from the totals for 1950, 1951, and 1952, and a revised estimate is calculated based on change observed in the remaining areas, the index for 1951 is about 1 million birds.

²No surveys were conducted in Mexico in 1957. The data indicate that it is unlikely that surveys in the United States, Canada, and Alaska accurately revealed the trend in wintering populations of ducks that year.

TABLE A-5. --Number of birds observed, by species, Central Flyway extended, winter survey, 1963 and 1964

Species	1963		1964		Percent change
	Number	Percent	Number	Percent	
Ducks:					
Dabblers:					
Mallard -----	1,659,559	32.4	2,195,673	36.0	+ 39.5
Black duck -----	2,948	Trace	158	Trace	- 94.6
Mottled duck -----	7,030	0.1	4,910	Trace	+ 79.6
Gadwall -----	95,565	1.8	121,249	2.0	+ 26.9
American widgeon -----	252,100	4.9	334,264	5.5	+ 32.6
Green-winged teal -----	223,500	4.4	257,836	4.2	+ 15.3
Blue-winged and					
Cinnamon teal -----	60,855	1.2	165,988	2.7	+172.6
Shoveler -----	65,793	1.3	89,125	1.5	+ 34.0
Pintail -----	602,685	11.8	784,520	12.8	+ 19.1
Wood duck -----	1,251	Trace	744	Trace	--
Tree duck -----	32,714	0.6	29,142	0.5	- 11.0
Subtotal -----	3,004,000	58.7	3,981,609	65.2	+ 32.5
Divers:					
Redhead -----	395,044	7.7	297,938	4.9	+ 47.9
Canvasback -----	21,382	0.4	24,700	0.4	+ 15.5
Scaup -----	315,358	6.2	108,788	1.8	- 65.3
Ring-necked duck -----	36,593	0.7	37,461	0.6	- 8.6
Goldeneye -----	11,034	0.2	5,104	0.1	+ 54.3
Bufflehead -----	5,833	0.1	3,861	Trace	- 24.4
Ruddy duck -----	10,108	0.2	18,281	0.3	+ 74.0
Subtotal -----	795,352	15.5	496,133	8.1	--
Miscellaneous:					
Eider and scoter -----	--	--	3	--	--
Merganser -----	82,450	1.6	88,168	1.4	+ 9.7
Subtotal -----	82,450	1.6	88,171	1.4	
Unidentified -----	139,538	2.7	263,408	--	+ 4.5
Total ducks -----	4,021,340	78.6	4,829,321	79.0	+ 20.0
Geese:					
Snow goose -----	405,309	7.9	288,497	4.7	- 28.9
Blue goose -----	20	Trace	41,923	0.7	+100.0
White-fronted goose -----	58,666	1.1	68,898	1.1	+ 17.4
Canada goose -----	201,573	3.9	251,812	4.1	+ 26.3
Total geese -----	665,568	13.0	651,130	10.6	- 1.8
Swans:					
Whistling swan -----	5	Trace	15	Trace	--
Trumpeter swan -----	258	Trace	38	Trace	--
Total swan -----	263	Trace	53	Trace	--
Coots -----	429,276	8.4	643,288	10.4	+ 49.8
Grand total -----	5,116,447	100.0	6,105,792	100.0	+ 24.4

TABLE A-6. --Distribution of wintering waterfowl, Central Flyway extended, 1963 and 1964

[Index numbers]		
Area	1963	1964
Montana -----	112,714	160,609
North Dakota -----	18,717	67,847
South Dakota -----	286,327	364,069
Wyoming-----	55,047	55,062
Nebraska -----	167,731	218,025
Colorado-----	246,465	387,330
Kansas -----	362,644	394,349
New Mexico-----	195,678	119,593
Oklahoma -----	264,778	307,595
Texas-----	2,319,848	2,553,176
Mexico:		
East coast-----	778,714	338,519
Central-----	307,784	1,139,618
Total -----	5,116,447	6,105,792

TABLE A-7. --Trend in waterfowl numbers, Central Flyway extended, winter survey, 1949 to 1964

[In thousands]

Year	Ducks	Geese	Coots	Total
1949-----	4,256	1,031	1,139	6,426
1950-----	5,542	839	615	6,996
1951-----	4,733	507	375	5,615
1952-----	6,116	409	1,017	7,542
1953-----	5,591	512	578	6,681
1954-----	6,441	723	1,322	8,486
1955-----	5,746	521	594	6,861
1956-----	7,814	693	1,025	9,532
1957-----	4,248 ¹	443	364 ¹	5,055
1958-----	8,202	567	812	9,581
1959-----	7,233	425	691	8,349
1960-----	4,240	501	536	5,277
1961-----	4,447	461	788	5,696
1962-----	3,434	407	643	4,484
1963-----	4,021	665	429	5,166
1964-----	5,071	654	643	6,369

See note to table A-4.

¹No surveys were conducted in Mexico in 1957. The data indicate that it is unlikely that surveys in the United States alone accurately revealed the trend in wintering population for either ducks or coots that year.

TABLE A-8.--Number of birds observed, by species, Mississippi Flyway extended, winter survey, 1963 and 1964.

Species	1963		1964		Percent change
	Number	Percent	Number	Percent	
Ducks:					
Dabblers:					
Mallard -----	2,733,263	31.5	4,069,648	32.2	+ 49.1
Black duck -----	148,086	1.7	218,071	1.7	+ 47.2
Mottled duck -----	32,100	0.4	82,200	0.7	+156.1
Gadwall -----	373,396	4.3	1,131,181	9.0	+203.0
American widgeon -----	255,816	2.9	614,445	4.9	+140.2
Green-winged teal -----	509,632	5.9	1,298,557	10.3	+154.8
Blue-winged teal -----	222,510	2.5	421,431	3.3	+ 89.4
Shoveler -----	264,545	3.0	349,505	2.8	+ 32.1
Pintail -----	729,025	8.4	1,416,393	11.2	+ 94.3
Wood duck -----	38,602	0.4	--	--	--
Subtotal -----	5,306,975	61.1	9,601,431	76.1	+ 80.9
Divers:					
Redhead -----	22,055	0.2	26,073	0.3	+ 18.2
Canvasback -----	44,073	0.5	41,388	0.4	- 6.1
Scaup -----	1,684,987	19.4	752,086	6.0	- 55.1
Ring-necked duck -----	108,632	1.2	129,865	1.0	+ 19.5
Goldeneye -----	34,122	0.4	27,719	0.2	- 18.7
Bufflehead -----	2,311	Trace	5,361	Trace	+132.0
Ruddy duck -----	20,655	0.2	23,056	0.1	+ 11.6
Subtotal -----	1,916,835	22.1	1,005,548	8.0	- 47.5
Miscellaneous:					
Eider and scoter -----	5	Trace	--	--	-100.0
Oldsquaw -----	9,261	0.1	2,595	Trace	72.0
Merganser -----	65,207	0.7	98,829	0.9	+ 51.6
Subtotal -----	74,473	0.8	101,424	0.8	+ 36.2
Unidentified -----	14,801	0.2	154,875	--	--
Total ducks -----	7,313,084	84.2	10,863,278	86.1	+ 48.6
Geese:					
Snow goose -----	69,033	0.8	87,827	0.8	+ 27.1
Blue goose -----	373,040	4.3	369,098	2.9	n/c
White-fronted goose -----	32,150	0.4	30,310	0.2	- 5.7
Canada goose -----	437,952	5.0	422,513	3.3	- 2.9
Total geese -----	912,175	10.5	909,748	7.2	- 0.3
Swans:					
Whistling swan -----	11	--	--	--	--
Mute -----	183	--	--	--	--
Total swans -----	194	--	--	--	--
Coots -----	452,324	5.2	852,052	6.7	+ 88.4
Grand total -----	8,677,777	100.0	12,625,078	100.0	+ 45.5

TABLE A-9. --Distribution of wintering waterfowl,
Mississippi Flyway extended, 1963 and 1964

[Index numbers]

Area	1963	1964
Ontario-----	56,370	--
Minnesota-----	15,617	15,847
Wisconsin-----	40,842	41,928
Michigan-----	44,275	71,719
Iowa-----	148,706	113,017
Missouri-----	373,445	472,705
Illinois-----	663,434	1,118,908
Indiana-----	82,919	59,283
Ohio-----	65,009	132,134
Kentucky-----	111,220	104,300
Arkansas-----	1,191,460	1,366,937
Tennessee-----	302,510	535,200
Louisiana-----	5,240,570	8,223,100
Mississippi-----	157,400	187,000
Alabama-----	184,000	183,000
Total-----	8,677,777	12,625,078

TABLE A-10. --Trend in waterfowl numbers, Mississippi
Flyway extended, winter survey, 1949 to 1964

[In thousands]

Year	Ducks	Geese	Coots	Total
1949-----	4,164	680	265	5,109
1950-----	2,842	601	211	3,654
1951-----	5,640	625	251	6,516
1952-----	3,961	559	404	4,924
1953-----	5,240	664	100	6,004
1954-----	5,403	783	123	6,309
1955-----	5,344	680	132	6,156
1956-----	7,460	768	137	8,365
1957-----	7,716	737	187	8,640
1958-----	6,759	750	295	7,804
1959-----	6,890	711	288	7,889
1960-----	6,684	767	434	7,885
1961-----	7,802	902	524	9,228
1962-----	6,677	729	569	7,975
1963-----	7,313	912	452	8,678
1964-----	10,863	910	852	12,625

See note to table A-4.

TABLE A-11.--Number of birds observed, by species, Atlantic Flyway extended, winter survey, 1963 and 1964

Species	1963		1964		Percent change
	Number	Percent	Number	Percent	
Ducks:					
Dabblers:					
Mallard -----	252,680	6.4	261,900	6.5	+ 3.6
Black duck -----	334,780	8.5	366,300	9.1	+ 9.4
Mottled duck -----	5,400	0.1	4,900	0.1	- 9.2
Gadwall -----	37,720	0.5	31,400	0.8	- 16.8
American widgeon -----	114,610	2.9	122,500	3.1	+ 6.9
Green-winged teal -----	110,394	2.8	74,100	1.9	- 32.9
Blue-winged teal -----	34,310	0.9	18,000	0.4	- 47.5
Shoveler -----	21,690	0.5	15,700	0.4	- 27.6
Pintail -----	181,700	4.6	170,700	4.3	- 6.0
Wood duck -----	19,230	0.4	(1)	--	--
Subtotal -----	1,112,514	28.1	1,065,500	26.6	- 4.2
Divers:					
Redhead -----	130,576	3.3	142,800	3.6	+ 9.4
Canvasback -----	164,050	4.1	190,000	4.7	+ 15.8
Scaup -----	611,773	15.5	856,900	21.4	+ 40.1
Ring-necked duck -----	134,310	3.4	168,500	4.2	+ 25.4
Goldeneye -----	100,010	2.5	84,400	2.1	- 15.6
Bufflehead -----	36,912	0.9	29,500	0.7	- 20.1
Ruddy duck -----	62,820	1.6	57,100	1.4	- 9.1
Subtotal -----	1,240,451	31.3	1,529,200	38.1	+ 31.3
Miscellaneous:					
Eider and scoter -----	200,918	5.1	102,300	2.7	- 83.4
Oldsquaw -----	21,080	0.5	3,500	Trace	- 55.7
Morganser -----	55,945	1.4	24,800	0.6	- 55.7
Subtotal -----	277,943	7.0	130,600	3.3	- 53.0
Unidentified -----	233,828	5.9	68,300	--	- 71.3
Total ducks -----	2,864,736	72.4	2,793,600	69.6	- 2.5
Geese:					
Snow goose -----	64,920	1.6	59,700	1.5	- 8.0
Blue goose -----	120	Trace	500	Trace	+316.7
Canada goose -----	480,816	12.1	528,200	13.2	+ 9.8
Total geese -----	545,856	13.8	588,400	14.7	+ 7.8
American brant -----	167,405	4.2	182,900	4.6	+ 9.2
Whistling swan -----	61,452	1.5	62,300	1.6	+ 1.4
Coots -----	323,540	8.1	386,600	9.6	+ 19.5
Grand total -----	3,962,989	100.0	4,013,800	100.0	+ 1.2

¹Wood duck included with unidentified.

TABLE A-12.--Distribution of wintering waterfowl, Atlantic Flyway extended, 1963 and 1964

[Index numbers]		
Area	1963	1964
Newfoundland-----	76,752	--
Quebec-----	8,379	--
Maritime Provinces-----	18,164	--
Maine-----	57,000	49,500
New Hampshire-----	4,000	6,500
Massachusetts-----	104,800	130,900
Connecticut-----	53,000	60,200
Rhode Island-----	27,500	30,800
New York ^{1/} -----	442,632	202,600
New Jersey-----	256,000	308,100
Pennsylvania-----	18,900	24,000
Delaware-----	50,400	100,600
Maryland-----	569,500	711,400
Virginia-----	176,730	142,100
West Virginia-----	11,800	13,800
North Carolina-----	401,820	393,100
South Carolina-----	777,400	620,500
Georgia-----	50,912	66,400
Florida-----	857,300	1,153,300
West Indies-----	--	--
Total-----	3,962,989	4,013,800

^{1/}Vermont included with New York.

TABLE A-13.--Trend in waterfowl numbers, Atlantic Flyway extended, winter survey, 1949 to 1964

[In thousands]						
Year	Ducks	Geese	Brant	Swans	Coots	Total
1949-----	2,685	365	75	42	863	4,030
1950-----	2,757	349	77	31	661	3,875
1951-----	3,314	334	114	34	560	4,356
1952-----	3,904	344	104	36	540	4,928
1953-----	4,670	552	155	56	1,403	6,836
1954-----	3,879	396	245	53	352	4,925
1955-----	4,344	567	184	90	616	5,801
1956-----	3,892	549	164	39	852	5,496
1957-----	2,862	403	162	40	649	4,116
1958-----	2,271	366	211	28	394	3,270
1959-----	2,278	339	217	28	311	3,173
1960-----	2,365	449	238	41	315	3,408
1961-----	2,566	613	265	61	331	3,836
1962-----	2,384	469	125	39	230	3,247
1963-----	2,865	546	167	61	324	3,963
1964-----	2,793	588	183	62	387	4,014

See note to table A-4.

TABLE A-14.--Number of birds, by species, east coast of Mexico, winter survey, January 1964 and 1963

Species	1964	1963
Ducks:		
Dabblers:		
Mallard -----	57	212
Mottled duck -----	170	243
Gadwall -----	68,054	21,753
American widgeon ---	70,799	55,343
Green-winged teal ---	30,798	18,086
Blue-winged teal ---	136,337	49,736
Shoveler -----	48,418	12,672
Pintail -----	90,392	32,256
Wood duck -----	--	83
Tree duck -----	29,142	32,644
Subtotal -----	474,167	223,028
Divers:		
Redhead -----	49,153	43,879
Canvasback -----	11,207	5,724
Scaup -----	76,370	76,262
Ring-necked duck ---	20,091	26,109
Goldeneye -----	--	--
Bufflehead -----	45	262
Ruddy duck -----	10,560	782
Subtotal -----	167,426	153,018
Miscellaneous:		
Merganser -----	82	1,301
Unidentified -----	--	66,303
Total ducks -----	641,675	443,650
Geese:		
Snow -----	6,850	3,140
Blue -----	--	--
White-fronted -----	33,036	22,478
Canada -----	7,806	8,187
Total geese -----	47,692	33,805
Swans:		
Whistling -----	11	--
Trumpeter -----	--	--
Coots -----	450,240	301,259
Grand total -----	1,139,618	778,714

TABLE A-15.--Number of birds, by species, west coast of Mexico
winter survey, January 1964 and 1963

Species	1964 ¹	1963
Ducks:		
Dabblers:		
Mallard -----	--	--
Gadwall -----	18,070	41,155
American widgeon ---	51,190	76,120
Green-winged teal ---	206,800	133,325
Blue-winged teal ---	173,530	84,600
Shoveler -----	142,720	250,205
Pintail -----	706,680	426,387
Wood duck -----	--	--
Tree duck -----	41,550	40,545
Subtotal -----	1,340,540	1,052,337
Divers:		
Redhead -----	27,970	27,775
Canvasback -----	395	700
Scaup -----	139,325	150,910
Ring-necked duck ---	--	1,300
Goldeneye -----	1,150	85
Bufflehead -----	850	95
Ruddy duck -----	9,950	32,950
Subtotal -----	179,640	213,815
Miscellaneous:		
Scoter -----	--	2,000
Merganser -----	--	1,600
Unidentified -----	--	51
Total ducks -----	1,520,180	1,269,803

¹Includes only areas surveyed both years.

TABLE A-16.--Number of birds, by species, northern interior of Mexico, winter survey, January 1964 and 1963

Species	1964	1963
Ducks:		
Dabblers:		
Mallard -----	455	700
Mexican duck-----	41	114
Gadwall -----	460	1,637
American widgeon ---	1,021	4,383
Green-winged teal ---	5,804	27,498
Blue-winged teal ----	140	571
Shoveler -----	2,911	22,470
Pintail -----	11,536	23,706
Wood duck-----	--	--
Tree duck-----	--	--
Subtotal -----	22,368	81,079
Divers:		
Redhead -----	485	32
Canvasback-----	237	2,128
Scaup -----	60	44
Ring-necked duck ----	390	652
Goldeneye -----	35	--
Bufflehead-----	31	30
Ruddy duck -----	610	3,095
Subtotal -----	1,848	5,981
Miscellaneous:		
Merganser -----	90	947
Unidentified-----	56,994	31,020
Total ducks -----	81,300	119,027
Geese:		
Snow and Blue -----	22,285	44,400
White-fronted -----	6,566	4,408
Canada -----	75	--
Total geese -----	28,926	48,808
Swans:		
Whistling -----	--	--
Trumpeter -----	--	--
Coots -----	20,215	11,349
Grand total -----	130,441	179,184

TABLE A-17. --Number of birds, by species, southern interior of Mexico,
winter survey, January 1964 and 1963

Species	1964	1963
Ducks:		
Dabblers:		
Mallard -----	--	--
Mexican duck-----	7,679	2,820
Gadwall -----	5,127	9,140
American widgeon ---	3,291	12,720
Green-winged teal ---	7,450	26,400
Blue-winged teal ----	24,703	7,725
Shoveler -----	11,009	2,965
Pintail -----	55,124	40,560
Wood duck-----	--	--
Tree duck -----	--	70
Subtotal -----	114,383	102,400
Divers:		
Redhead -----	2,090	--
Canvasback -----	1,055	1,925
Scaup -----	290	200
Ring-necked duck ----	3,677	50
Goldeneye -----	--	--
Bufflehead-----	28	50
Ruddy duck -----	100	825
Subtotal -----	7,240	3,050
Unidentified-----	49,730	--
Total ducks -----	171,353	105,450
Geese:		
Snow -----	800	950
Blue-----	--	--
White-frosted -----	1,450	1,400
Canada -----	--	--
Total geese -----	2,250	2,350
Swans:		
Whistling -----	--	--
Trumpeter -----	--	--
Coots -----	34,475	20,800
Grand total -----	208,078	128,600

B. WATERFOWL BREEDING GROUND SURVEY TABLES

TABLE B-1. --Statistical summary, waterfowl breeding population survey, Alaska, 1963 and 1964

	Stratum I	Stratum II	Total
Area (sq. mi.)-----	43,450	33,200	76,650
Sample (sq. mi.):			
1963-----	200	150	350
1964-----	202	182	384
Population index:			
Ducks per sq. mi.:			
1963-----	16.5	22.1	18.4
1964-----	17.4	18.7	17.9
Total ducks:			
1963-----	679,100	734,500	1,413,600
1964-----	753,930	621,800	1,375,730
Game ducks: ¹			
1963-----	470,650	672,800	1,143,450
1964-----	533,530	666,020	1,199,550

¹Excludes scoter, eider, oldsquaw, and merganser.

TABLE B-2. --Waterfowl breeding population index, by species and stratum, Alaska, 1963 and 1964

Species	Stratum I		Stratum II		Total		Percent change
	1963	1964	1963	1964	1963	1964	
Dabblers:							
Mallard -----	24,450	20,350	58,700	46,640	83,150	66,990	-20
Gadwall -----	--	750	--	--	--	750	--
American widgeon --	6,800	12,050	19,800	23,630	26,600	35,680	+34
Green-winged teal --	1,600	3,000	tr	7,460	1,600	10,460	+554
Shoveler -----	1,600		3,600	7,460	5,200	7,460	+43
Pintail -----	186,000	207,830	191,900	170,930	377,900	378,760	no change
Subtotal -----	220,450	243,980	274,000	256,120	494,450	500,100	+4
Divers:							
Canvasback -----	--	--	16,900	11,200	16,900	11,200	-34
Scaup -----	246,500	295,550	338,600	266,730	585,100	562,280	-4
Goldeneye -----	2,900	6,000	7,300	2,500	10,200	8,500	-16
Bufflehead -----	800	1,500	36,000	30,470	36,800	31,970	-13
Subtotal -----	250,200	303,050	398,900	310,900	649,000	613,950	-5
Miscellaneous:							
Scoter -----	103,200	98,350	61,700	49,780	164,900	148,130	-10
Eider -----	10,850	19,600	--	--	10,850	19,600	+80
Oldsquaw -----	94,400	87,450	tr	5,000	94,400	92,450	-2
Merganser -----	--	1,500	--	--	--	1,500	--
Subtotal -----	208,450	206,900	61,700	54,780	270,150	261,680	-3
Total -----	679,100	753,930	734,500	621,800	1,413,600	1,375,730	-2

TABLE B-3. --Whistling swan breeding population indexes, Alaska, 1958 to 1964

	1958	1959	1960	1961	1962	1963	1964
Area sampled (sq. mi.)-	640	644	604	648	492	468	414
Number counted ----	600	546	710	759	470	567	481
Population indexes --	63,735	58,640	79,310	79,040	55,965	64,000	50,400

TABLE B-4. --Comparative brood counts from three study areas in interior Alaska 1962 to 1964

Species	Tetlin			Yukon Flats			Minto Lakes		
	Number broods counted			Number broods counted			Number broods counted		
	1962	1963	1964	1962	1963	1964	1962	1963	1964
Pintail	18	11	4	27	50	17	56	32	17
Mallard	14	23	2	15	12	11	16	27	4
American widgeon	18	23	6	111	85	40	48	94	35
Shoveler	1			21	17	7	18	10	1
Blue-winged teal		1							
Green-winged teal	30	27	19	32	37	12	13	24	10
Scaup ¹	2	11	2	9	43	16	73	90	36
Canvasback	18	14	2	22	19	4	36	4	1
Goldeneye	4	2	2	1	1	2	1	7	2
Bufflehead	14	8	4	3	4	4	21	15	8
Scoter ¹	2	3		3	5	1	1		
Unidentified	14	3	8	3					
Total	135	126	49	247	273	114	283	303	114

¹Census too early for significant number of these species to have hatched except at Minto.

TABLE B-5. --Waterfowl breeding population index, in northern Alberta, northeastern British Columbia, Northwest Territories, and Yukon, 1964 and 1963
[in thousands]

Species	Index for stratum--											Total		Percent change from 1963
	1.1	1.2	2	3	4	5	6	7	8	9	10	1964	1963	
Ducks:														
Dabblers:														
Mallard -----	204	156	48	85	17	82	13	21	2	--	Trace	628	623	--
Gadwall -----	9	--	1	--	--	--	--	--	--	--	--	10	5	+104
American widgeon -----	59	75	9	27	13	19	6	26	4	5	4	247	156	+57
Green-winged teal -----	33	77	3	22	4	26	2	4	1	--	1	173	117	+48
Blue-winged teal -----	44	28	3	--	--	4	--	--	--	--	--	79	53	+49
Shoveler -----	42	61	6	10	3	57	2	1	--	--	Trace	182	47	+286
Pintail -----	42	39	8	24	6	32	4	30	13	9	6	213	156	+36
Subtotal -----	433	436	78	168	43	220	27	82	20	14	11	1,532	1,157	+32
Divers:														
Redhead -----	30	16	5	--	--	--	--	--	--	--	--	51	32	+55
Canvasback -----	29	--	12	13	--	--	--	4	1	--	--	59	67	-13
Scaup -----	324	152	7	351	163	28	83	371	38	46	24	1,587	1,539	+3
Ring-necked duck -----	12	7	1	22	--	5	5	2	--	--	--	54	46	+18
Goldeneye -----	28	4	8	25	1	--	--	2	1	--	--	69	13	+432
Bufflehead -----	46	59	6	16	3	14	6	2	--	--	--	152	113	+33
Ruddy duck -----	20	--	1	--	--	--	--	--	--	--	--	21	14	+43
Subtotal -----	489	238	40	427	167	47	94	381	40	46	24	1,893	1,824	+3
Miscellaneous:														
Scoter and eider -----	54	42	1	190	126	--	4	410	26	25	20	898	602	+49
Oldsquaw -----	--	3	--	97	47	--	--	94	1	33	7	282	81	+247
Merganser -----	22	1	3	14	29	1	--	12	2	1	--	85	85	--
Subtotal -----	76	46	4	301	202	1	4	516	29	59	27	1,265	768	+65
Total ducks -----	998	720	122	896	412	268	125	979	89	119	62	4,690	3,749	+25
Geese:														
White-fronted -----	--	--	--	--	--	--	--	--	--	2	1	3	2	+50
Canada -----	6	3	1	2	6	--	--	3	--	--	Trace	21	60	-66
Swans -----	--	--	--	--	--	--	--	9	2	7	1	19	32	-44
Coots -----	21	--	2	--	--	--	--	--	--	--	--	23	25	-6
Grand total -----	1,025	723	125	898	418	268	125	991	91	128	64	4,756	3,868	

TABLE B-6. --Aerial brood counts in Northwest Territories and Yukon,
July and August 1964

Strata and size	Number of broods			Total ¹ broods	Single adults	Pairs	Average size of broods			Groups of 3 to 10 ²	Percent change from 1961
	Class I	Class II	Class III				Class I	Class II	Class III		
Stratum 2 (31.5 sq. mi.) -----	9	24	6	39	75	31	4.0	4.5	4.7	30	-90
Stratum 3 (18 sq. mi.) -----	--	20	--	20	8	9	--	6.4	--	9	+300
Stratum 4 (85.5 sq. mi.) -----	5	27	1	35	22	14	6.0	5.9	5.0	7	+170
Stratum 6 (13.5 sq. mi.) -----	8	31	5	45	4	4	8.0	6.4	4.0	9	+87
Stratum 7 (148.5 sq. mi.) -----	38	103	9	153	58	33	6.3	4.0	5.1	37	+84
Stratum 8 (27 sq. mi.) -----	12	32	5	51	16	12	5.0	5.8	6.2	16	+325
Stratum 10 (36 sq. mi.) -----	9	66	2	81	17	16	4.6	5.2	4.5	20	+100
Total (360 sq. mi.) -----	81	303	28	424	200	119	5.5	5.8	5.0	128	+68

¹Total greater than sum of classes with addition of unclassified.

²Possibly class III broods.

TABLE B-7. -- Long-term trend in May and July pond indexes by strata,
southern Alberta, May and July, 1955 to 1964

[Index numbers in thousands]

Year	Stratum			Total
	A	B	C	
May:				
1954-----	434	607	122	1,163
1955-----	405	656	191	1,252
1956-----	353	598	116	1,067
1957-----	187	442	82	711
1958-----	255	431	120	806
1959-----	131	253	120	504
1960-----	257	550	193	1,000
1961-----	191	432	69	692
1962-----	118	345	60	523
1963-----	170	602	72	844
1964-----	138	366	137	641
Average, 1952-64-----	262	491	120	874
Percent change, 1964 from --				
Average -----	-47	-25	+14	-27
1963-----	-19	-39	+90	-24
July:				
1954-----	241	400	65	706
1955-----	218	339	66	623
1956-----	185	420	64	669
1957-----	120	288	42	450
1958-----	136	282	53	471
1959-----	93	140	74	307
1960-----	84	262	57	403
1961-----	51	153	35	239
1962-----	65	257	48	360
1963-----	145	471	73	689
1964-----	78	162	72	312
Average, 1952-64-----	164	302	70	536
Percent change, 1964 from --				
Average -----	-52	-46	+2	-42
1963-----	-46	-66	-2	-55

TABLE B-8.--Waterfowl breeding population index, by species and stratum,
southern Alberta, May, 1963 and 1964

[Index numbers in thousands]

Species	Stratum			Total ¹		Average 1952 to 1964	Percent change from--	
	A	B	C	1963	1964		1963	Average
Ducks:								
Dabblers:								
Mallard -----	178	546	111	739	835	916	+3	-9
Gadwall -----	25	67	8	85	100	85	+18	+18
American widgeon --	53	136	22	133	211	175	+59	+20
Green-winged teal --	2	20	2	15	24	39	+63	-38
Blue-winged teal ---	24	82	6	60	112	133	+87	-16
Shoveler -----	59	120	30	188	209	175	+11	+19
Pintail -----	121	62	95	348	278	569	-20	-51
Subtotal -----	462	1,033	274	1,568	1,769	2,092	+13	-16
Divers:								
Redhead -----	7	34	3	38	44	46	+17	-5
Canvasback -----	8	45	3	49	56	51	+13	+10
Scaup -----	51	179	28	261	258	244	-1	+6
Ring-necked duck ---	--	--	--	Tr	Tr	1	--	--
Goldeneye -----	Tr	Tr	--	--	--	3	--	--
Bufflehead -----	1	14	--	14	15	18	+7	-14
Ruddy duck -----	1	14	2	10	17	19	+68	-10
Subtotal -----	68	286	36	373	390	382	+5	+2
Miscellaneous:								
Scoter -----	Tr	32	--	17	32	35	+94	-9
Total ducks -----	530	1,351	310	1,958	2,191	2,509	+12	-13
Geese:								
Canada goose -----	3	--	3	2	6	4 ¹	--	--
Coots -----	17	59	13	61	89	87	+45	+1
Grand total -----	550	1,410	326	2,021	2,286	2,600	+13	-12

¹Two-year average 1963-1964.

TABLE B-9. -- Lone drake index, southern Alberta,
1955 to 1964

[Expressed as percentage of total drakes]

Year	Mallard	Pintails	Canvasback
1955-----	77.30	81.16	67.37
1956-----	84.60	85.09	63.12
1957-----	92.03	88.82	81.60
1958-----	85.80	84.34	75.47
1959-----	70.66	73.26	42.84
1960-----	84.92	82.02	72.04
1961-----	77.10	74.22	63.89
1962-----	82.39	83.98	54.32
1963-----	85.44	85.44	81.27
1964-----	74.94	88.28	51.10

TABLE B-10. -- Waterfowl brood and late-nesting indexes, by stratum, compared with previous year and long-term averages, southern Alberta, July, 1963 and 1964

[Index numbers in thousands]

Species	For stratum--			Total		Average 1956 1964	Percent change from--	
	A	B	C	1963	1964		1963	Average
Broods:								
Duck brood index -----	33	142	14	202	189	234	-6	-19
Average brood size ¹ -----	6.1	6.3	5.6	6.2	6.2	5.9	No count	+5
Coot brood index -----	1	17	Trace	19	18	47	-5	-62
Late nesting index ² -----								
Dabblers:								
Mallard -----	1	Trace	2	2	3	4		
Gadwall -----	1	--	Trace	2	1	2		
American widgeon ---	--	--	1	Trace	1	.5		
Green-winged teal ---	Trace	--	--	--	--	Trace		
Blue-winged teal ----	Trace	--	Trace	Trace	Trace	1		
Shoveler -----	1	Trace	1	1	2	1		
Pintail -----	Trace	--	Trace	Trace	Trace	.5		
Subtotal -----	3	Trace	4	5	7	9	+40	-22
Divers:								
Redhead -----	--	--	Trace	--	Trace	Trace		
Canvasback -----	--	--	--	--	--	Trace		
Scaup -----	1	1	1	1	3	7		
Ring-necked duck ----	--	--	--	--	--	Trace		
Goldeneye -----	--	--	--	--	--	Trace		
Bufflehead -----	--	--	--	--	--	Trace		
Ruddy duck -----	Trace	1	Trace	2	1	3		
Subtotal -----	1	2	1	3	4	10	+33	-60
Total -----	4	2	5	8	11	19	+37	+42

¹Class II and III broods only.

²As indicated by adult pairs and singles.

TABLE B-11. --Duck production index, Washington, 1963 and 1964

[Includes young]

Region or habitat	Index		Percent change from-- 1963
	1963	1964	
Scabland and plateau potholes -----	217,000	150,000	-31
Northeastern highlands -----	88,000	98,000	+11
Irrigated areas -----	98,000	107,000	+9
Other eastern Washington habitat -----	15,000	12,000	-23
Western Washington -----	44,000	40,000	-8
Total -----	462,000	407,000	-12

TABLE B-12. --Goose production index, Oregon, 1963 and 1964

Transect	Total broods		Total young	
	1963	1964	1963	1964
Klamath River -----	194	264	871	1,192
Klamath Marsh -----	67	44	300	200
Sprague River -----	20	43	90	193
Alkali Lake -----	14	14	62	62
Spring Lake -----	14	14	65	65
Nuss Lake -----	16	30	71	137
Agency Lake -----	22	48	97	216
Wocus Bay -----	26	41	118	187
Howard Bay -----	4	25	17	112
Summer Lake -----	55	56	243	231
N. Lake County -----	26	29	131	116
Columbia River -----	11	2	48	9
Wickiup Reservoir -----	10	20	36	81
G. I. Ranch -----	4	9	15	35
Malheur Refuge -----	278	333	1,250	1,500
Total -----	761	972	3,414	4,336

TABLE B-13. --Duck production index, by areas, Oregon, 1963 and 1964

Transect	Square miles	Total broods		Total young	
		1963	1964	1963	1964
Klamath Basin -----	26	117	233	770	1,447
Summer Lake -----	1	114	113	939	862
N. Lake County -----	4	35	42	274	306
Umatilla County -----	4	15	17	93	83
Jefferson County -----	1	12	4	68	22
Wasco County -----	1	16	12	74	75
Malheur County -----	45	90	76	524	498
G. I. Ranch -----	1	21	5	162	54
Total -----	83	420	502	2,904	3,347

TABLE B-14. --Duck production index, by species, Oregon, 1963 and 1964

[Comparative trends on 108.7 square miles]

Species	Number of broods		Number of young	
	1963	1964	1963	1964
Ducks:				
Dabblers:				
Mallard -----	165	184	1,068	1,188
Gadwall -----	67	62	551	508
American widgeon -----	1	6	7	34
Blue-winged teal ¹ -----	110	115	718	831
Shoveler -----	4	5	25	30
Wood duck -----	--	1	--	3
Pintail -----	24	13	153	89
Subtotal -----	371	386	2,522	2,683
Divers:				
Redhead -----	82	183	604	1,196
Canvasback -----	4	2	21	15
Scaup -----	6	--	33	--
Ruddy duck -----	102	45	559	269
Subtotal -----	194	230	1,217	1,480
Miscellaneous:				
Merganser -----	3	2	33	12
Unidentified -----	6	11	38	54
Total -----	574	629	3,810	4,229

¹Includes cinnamon teal.

TABLE B-15. --Fall population index, by species and area, California, 1964

Species	Sacramento Valley	Suisun Marsh	North San Joaquin Valley	South San Joaquin Valley	North-eastern California	Klamath Basin	Total
Ducks:							
Dabblers:							
Mallard ---	97,390	4,270	7,290	3,120	31,980	12,440	156,490
Gadwall ---	800	2,260	1,760	220	6,630	11,180	22,850
Cinnamon teal ----	8,370	950	1,920	660	8,390	3,990	24,280
Shoveler ---	180	120	380	--	1,240	1,240	3,160
Pintail ----	1,080	110	280	110	8,800	7,150	17,530
Subtotal	107,820	7,710	11,630	4,110	57,040	36,000	224,310
Divers:							
Redhead ---	1,750	120	190	140	5,370	12,620	20,190
Scaup ----	--	--	--	--	810	8,060	8,870
Ruddy duck ----	--	--	390	--	1,330	11,910	13,630
Subtotal	1,750	120	580	140	7,510	32,590	42,690
Miscellaneous	--	--	30	40	1,060	13,340	14,470
Total ducks	109,570	7,830	12,240	4,290	65,610	81,930	281,470
Canada goose ¹ ---	--	--	--	--	16,970	6,610	23,580
Coots -----	121,640	1,110	18,390	11,420	13,140	25,040	190,740

¹Includes nonbreeding component.

TABLE B-16. --Nesting pair and fall population estimates, California, 1963 and 1964

Species	Nesting pairs		Fall population index ¹	
	1963	1964	1963	1964
Ducks:				
Dabblers:				
Mallard -----	29,490	34,680	137,740	156,490
Gadwall -----	5,300	3,410	25,840	22,850
Cinnamon teal -----	4,380	5,230	18,440	24,280
Shoveler -----	1,340	590	4,840	3,160
Pintail -----	5,690	4,500	22,810	17,530
Subtotal -----	46,200	48,410	209,670	224,310
Divers:				
Redhead -----	4,990	3,060	22,190	20,190
Scaup -----	640	1,430	3,820	8,870
Ruddy duck -----	2,250	2,440	10,730	13,630
Subtotal -----	7,880	6,930	36,740	42,690
Miscellaneous -----	3,280	2,560	16,550	14,470
Total ducks -----	57,360	57,900	262,960	281,470
Canada goose-----	2,410	1,540	25,710	23,580
Coots -----	26,980	39,350	131,110	190,740

¹Includes young and resident adults.

TABLE B-17. --Aerial breeding-pair count on key production areas, Nevada, 1963 and 1964

Species	1963	1964
Ducks:		
Dabblers:		
Mallard -----	896	1,225
Gadwall -----	631	745
Cinnamon teal -----	808	1,184
Shoveler -----	91	163
Pintails -----	360	481
Subtotal -----	2,786	3,798
Divers:		
Redhead -----	1,242	1,450
Canvasback -----	125	78
Ruddy duck -----	268	1,066
Subtotal -----	1,635	2,594
Unidentified-----	75	245
Total ducks -----	4,496	6,637
Canada goose-----	457	527

**TABLE B-18.--Waterfowl production index, by species,
Nevada, 1963 and 1964**

Species	1963	1964	Percent change from 1963
Ducks:			
Dabblers:			
Mallard -----	729	1,014	+39
Gadwall -----	523	923	+76
American widgeon -----	--	--	--
Green-winged teal -----	63	35	-44
Cinnamon teal -----	349	1,908	+446
Shoveler -----	46	30	-35
Pintail -----	349	835	+139
Subtotal -----	2,059	4,745	+130
Divers:			
Redhead -----	689	1,209	+75
Canvasback -----	170	125	-26
Scaup -----	23	--	--
Ruddy duck -----	128	398	+210
Subtotal -----	1,010	1,732	+71
Total ducks -----	3,069	6,477	+111
Canada goose -----	615	712	+16

TABLE B-19.--Duck numbers, aerial surveys, Utah, 1963 and 1964

	Route flown						Total
	Box Elder County	Weber County	Davis County	Jordan River Clubs	Salt Lake County	Utah County	
Area sampled (sq. mi.) -----	48.0	15.5	14.2	6.2	6.7	18.0	108.6
Ducks:							
Number counted:							
1963 -----	2,076	1,039	1,160	710	69	464	5,518
1964 -----	2,595	1,050	1,056	564	33	280	5,578
Number per square mile:							
1963 -----	43.3	67.0	81.7	114.5	10.3	25.8	50.8
1964 -----	54.1	67.7	74.4	91.0	4.9	15.6	51.4
Percent change, from 1963 -----	+25	--	-10	-20	-52	-40	no change

TABLE B-20. --Dike line breeding pair counts of waterfowl
on four State refuges, Utah, 1963 and 1964

Species	1963	1964
Ducks:		
Dabblers:		
Mallard -----	783	920
Gadwall -----	673	783
American widgeon -----	6	27
Green-winged teal -----	24	126
Blue-winged teal -----	52	39
Cinnamon teal -----	863	1,042
Shoveler -----	635	676
Pintail -----	528	564
Subtotal -----	3,564	4,177
Divers:		
Redhead -----	1,590	1,819
Canvasback -----	2	2
Scaup -----	15	18
Goldeneye -----	--	1
Bufflehead -----	1	2
Ruddy duck -----	328	381
Subtotal -----	1,936	2,223
Total ducks -----	5,500	6,400
Canada goose -----	187	155

TABLE B-21. --Species composition of breeding populations of waterfowl, Utah, 1963 and 1964

Species	Northern area		Southern area	
	1963	1964	1963	1964
Ducks:				
Dabblers:				
Mallard -----	14.2	16.0	22.2	18.3
Gadwall -----	12.0	11.6	10.8	13.7
American widgeon -----	0.3	0.1	1.5	2.1
Green-winged teal -----	0.5	0.6	2.0	11.5
Blue-winged teal -----	1.0	0.7	0.9	0.8
Shoveler -----	10.9	10.9	7.8	6.5
Pintail -----	8.5	8.0	16.1	15.6
Divers:				
Redhead -----	31.3	29.4	17.1	14.1
Canvasback -----	0.2	(2 obs.)	(1 obs.)	--
Scaup -----	0.4	0.2	1.6	1.2
Ring-necked duck -----	--	--	--	--
Goldeneye -----	--	--	--	(1 obs.)
Bufflehead -----	--	--	0.2	0.1
Ruddy duck -----	5.9	6.1	8.1	4.4
Total -----	100.0	100.0	100.0	100.0

TABLE B-22. --Canada goose production index, Utah, 1963 and 1964

Area	Number of broods		Number of young	
	1963	1964	1953	1964
Cutler Reservoir -----	26	5	147	20
Public shooting grounds-----	32	15	161	58
Bear River Refuge and vicinity-----	446	308	2, 167	1, 369
Ogden Bay Refuge-----	85	79	408	395
Farmington Bay Refuge-----	65	54	341	252
Scipio Reservoir-----	5	1	23	4
Fool's Creek Reservoir-----	Dry		Dry	
Redmond Lake-----	12	11	60	52
Gunnison Reservoir-----	8	8	38	39
Clear Lake Refuge-----	5	3	26	16
Mona Reservoir-----	2 ¹	10	10	36
Wales Reservoir-----	18	13	76	70
Rich Co. (Bear River)-----	91	110	422	463
Kooshaerm Reservoir-----	5	7	21	26
Bicknell Bottoms-----	9	9	38	43
Total-----	809	633	3, 938	2, 843

¹Incomplete count.

TABLE B-23. --Aerial counts, Canada goose breeding pairs and grouped birds, Idaho, 1963 and 1964

Area	1963	1964
Snake River drainage:		
Farewell Bend to railroad bridge ----	1,351	1,748
Payette River (mouth to Emmett) ----	477	318
Strike Dam to American Falls Dam----	222	231
North Fork, including Island Park----	451	419
South Fork -----	239	158
Mud Lake - Camas Refuge area - ----	210	186
Gray's Lake area -----	814	872
Blackfoot Reservoir area -----	587	562
Subtotal -----	4,351	4,494
Bear River and drainage:		
Dingle Marsh area -----	2,225	1,605
Total -----	6,576	6,099

TABLE B-24. --Canada goose production index, Idaho, 1963 and 1964

Nesting unit	1963	1964	Percent change from 1963
Southwestern Idaho:			
Homedale -----	1,116	1,162	+4
Payette River -----	711	577	-19
Southeastern Idaho:			
Blackfoot Reservoir -----	483	317	-34
Island Park Reservoir -----	128	69	-46
North Fork Snake River -----	149	51	-65
North Lake -----	33	81	+145
Total -----	2,620	2,257	-14

TABLE B-25. --Number of broods, by species, observed on trend routes in southeastern Idaho, 1963 and 1964

Species	1963	1964
Milner Canal:		
Dabblers:		
Mallard -----	35	20
Gadwall -----	4	2
American widgeon -----	9	6
Green-winged teal -----	7	3
Blue-winged & cinnamon teal -----	3	2
Pintail -----	2	--
Subtotal -----	60	33
Divers:		
Redhead -----	--	--
Subtotal -----		
Unidentified -----	--	--
Total -----	60	33
Blackfoot Reservoir:		
Dabblers:		
Mallard -----	49	15
Gadwall -----	76	56
American widgeon -----	24	29
Green-winged teal -----	1	1
Blue-winged & cinnamon teal -----	--	1
Pintail -----	6	12
Shoveler -----	--	--
Subtotal -----	156	114
Divers:		
Redhead -----	1	2
Canvasback -----	--	--
Lesser scaup -----	3	1
Ruddy duck -----	--	--
Subtotal -----	4	3
Unidentified -----	1	--
Total -----	161	117

TABLE B-26. --May and July pond indexes by strata and comparisons with average and previous year, southern Saskatchewan, 1956 to 1964

Year	Stratum					Total
	A-East	A-West	B-East	B-West	C	
May:						
1956 -----	754.4	700.3	644.8	284.2	105.8	2,489.5
1957 -----	292.3	357.9	576.2	148.5	72.2	1,447.1
1958 -----	526.5	350.5	498.6	191.0	105.1	1,671.7
1959 -----	157.7	334.5	160.2	57.4	73.6	783.4
1960 -----	479.2	987.4	377.3	164.3	90.1	2,098.3
1961 -----	48.7	171.1	221.4	92.0	55.7	588.9
1962 -----	153.2	336.3	635.4	173.3	49.1	1,347.3
1963 -----	239.4	256.0	293.9	131.6	39.5	960.4
1964 -----	508.1	202.1	325.9	114.9	37.7	1,188.7
Average 1956 to 1964--	344.6	462.6	444.8	158.7	78.8	1,489.5
Percent change, 1964						
from 1963 -----	+56.3	-23.9	-53.7	-24.1	-19.6	-28.7
Average -----	-30.5	-44.7	-33.9	-17.1	-49.9	-35.5
July:						
1958 -----	212.8	141.8	267.4	107.1	33.8	762.9
1959 -----	143.0	120.5	145.0	36.8	26.0	471.3
1960 -----	212.4	265.2	318.1	88.0	32.7	916.4
1961 -----	34.4	50.6	61.2	37.1	9.8	193.1
1962 -----	75.7	61.8	68.6	26.3	13.3	245.7
1963 -----	173.8	227.4	161.8	84.5	41.6	689.1
1964 -----						
Average 1958 to 1964--	135.7	128.0	172.1	59.1	23.1	517.9
Percent change, 1964						
from 1963 -----	+129.6	+268.0	+135.9	+221.3	+212.8	+180.5
Average -----	+28.1	+77.7	-6.0	+43.0	+80.1	+33.1

TABLE B-27. --Waterfowl breeding population index, by species and stratum,
southern Saskatchewan, May 1963 and 1964

[Index numbers in thousands]

Species	Stratum					Total		Average 1956 to 1963	Percent change from :	
	A-East	A-West	B-East	B-West	C	1963	1964		1963	Average
Ducks:										
Dabblers:										
Mallard -----	115.1	198.1	195.7	122.1	40.4	774.4	671.4	1,655.7	-13.3	-59.5
Black duck -----	--	--	--	--	--	--	--	0.1	--	--
Gadwall -----	12.6	58.9	30.4	34.4	25.3	103.0	161.6	77.0	+56.9	+109.9
American widgeon --	13.1	23.0	21.4	25.6	5.7	73.0	88.8	160.5	+21.6	-44.7
Green-winged teal --	0.2	1.8	1.2	4.6	--	9.1	7.8	24.0	-14.3	-67.5
Blue-winged teal --	27.3	50.9	26.1	14.1	7.1	59.0	125.5	168.9	+112.7	+25.7
Shoveler -----	23.6	55.1	50.3	42.3	6.1	101.4	177.4	194.6	+75.0	+8.8
Pintail -----	46.4	88.4	60.6	39.5	19.6	257.7	254.5	676.4	-1.2	-62.4
Wood duck -----	--	--	--	--	--					
Subtotal -----	238.3	476.2	385.7	282.6	104.2	1,377.6	1,487.0	2,957.3	+7.9	-49.7
Divers:										
Redhead -----	3.7	7.1	13.8	7.0	--	14.0	31.6	63.3	+125.7	-50.1
Canvasback -----	7.4	11.1	23.2	15.4	0.4	52.4	57.5	116.7	+9.7	-50.7
Scaup -----	18.9	9.0	13.8	22.5	0.6	58.3	64.8	220.4	+11.2	-70.6
Ring-necked duck --	0.3	1.3	6.6	1.6	0.6	5.7	10.4	7.8	+82.5	+33.3
Goldeneye -----	0.3	--	0.6	0.3	--	1.6	1.2	6.1	-25.0	-80.3
Bufflehead -----	0.6	--	2.7	5.8	--	10.0	9.1	10.3	-9.0	-11.7
Ruddy duck -----	0.3	1.3	3.7	4.7	--	9.9	10.0	37.3	+1.0	-73.2
Subtotal -----	31.5	29.8	64.4	57.3	1.6	151.9	184.6	462.0	+21.5	-60.1
Miscellaneous:										
Merganser -----	0.2	--	1.2	--	--	5.4	1.4	2.7	-74.1	-48.2
Scoter -----	--	--	3.9	4.3	--	4.3	8.2	6.0	+90.7	+36.7
Subtotal -----	0.2	--	5.1	4.3	--	9.7	9.6	8.6	-1.0	+11.6
Total ducks -----	270.0	506.0	455.2	344.2	105.8	1,539.2	1,681.2	3,427.9	+9.2	-51.0
Geese:										
Canada goose -----		0.5	1.6	0.2	0.9	3.6	3.2	1.6	-11.1	+100.0
Coots -----	16.1	6.3	9.0	8.9	2.9	26.2	43.2	179.7	+64.9	-76.0
Grand total -----	286.1	512.8	465.8	353.3	109.6	1,569.0	1,727.6	3,609.2	+10.1	-52.1

TABLE B-28. --Lone Drake index, southern
Saskatchewan, 1956 to 1964

[Expressed as percentage of total drakes]

Year	Percent of Lone Drakes ¹
1956 -----	78.5
1957 -----	80.7
1958 -----	80.2
1959 -----	73.0
1960 -----	84.7
1961 -----	71.9
1962 -----	47.3
1963 -----	82.6
1964 -----	83.5

¹ Includes only mallard, pintail, and canvas-back

TABLE B-29. --Waterfowl brood and late-nesting indexes by stratum compared with previous
year and long-term average, southern Saskatchewan, 1963 and 1964

[Index numbers in thousands]

Species	Stratum					Total		Average 1958 to 1963	Percent change from:	
	A-East	A-West	B-East	B-West	C:	1963	1964		1963	Average
Broods:										
Duckbrood index -----	10.6	14.9	19.9	18.7	2.8	45.8	66.9	231.7 ³	+46.1	-71.1
Average brood size ¹ --	5.9	5.2	5.6	6.1	6.0	5.4	5.7	5.1 ³	+5.6	+11.8
Coot brood index ----	1.8	2.1	3.9	1.4	0.0	5.2	9.2	37.6 ³	+76.9	-75.5
Late-nesting index ² :										
Dabblers:										
Mallard -----	3.5	7.4	2.7	4.5	1.6	23.1	19.7	43.3	-14.7	-54.6
Gadwall -----	0.4	2.2	1.2			9.7	3.8	6.5	-60.8	-41.5
American widgeon ---	0.2	0.1				3.5	0.3	6.1	-91.4	-95.1
Green-winged teal --						0.9		0.6		
Blue-winged teal ---	1.6	3.7				8.1	5.3	12.7	-34.6	-58.3
Shoveler -----	0.4	1.1				3.1	1.5	3.2	-51.6	-53.1
Pintail -----	0.4	0.8				6.5	1.2	5.8	-81.5	-79.3
Subtotal -----	6.5	15.3	3.9	4.5	1.6	54.9	31.8	78.2	-42.1	-59.3
Divers:										
Redhead -----		1.3				1.6	1.3	1.5	-18.8	-13.3
Canvasback -----			0.8			0.6	0.8	1.3	+33.3	-38.5
Scaup -----	1.9	0.4	6.6			2.8	8.9	6.6	+217.9	+34.9
Ring-necked duck ---		0.1				2.3	0.1	1.1	-95.7	-90.9
Goldeneye -----	0.2						0.2	0.3		-33.3
Bufflehead -----			0.8				0.8	0.2		+300.0
Ruddy duck -----	0.9	0.4	1.9	1.0		4.0	4.2	5.9	+5.0	-28.8
Subtotal -----	3.0	2.2	10.1	1.0	0.0	11.3	16.3	16.9	+44.3	-3.6
Miscellaneous ducks ---	--	--	--	--	--	1.4	0	0.7	--	--
Total -----	9.5	17.5	14.0	5.5	1.6	67.6	48.1	95.8	-28.9	-49.8

¹ Class II and III broods only.

² As indicated by adult pairs and singles.

³ 11-year average - 1952 to 1962.

TABLE B-30. --Number of water areas per square mile, Montana, 1959 to 1964

	Sheridan County	Hi-Line		Great Falls- Piedmont
		Eastern	Central	
Reservoirs:				
1959 -----	0.43	0.64	1.10	1.22
1960 -----	.35	.51	.91	1.79
1961 -----	.27	.55	1.09	.83
1962 -----	.24	.59	1.09	1.11
1963 -----	.29	.72	1.13	.73
1964 -----	.51	.57	.62	1.11
Potholes:				
1959 -----	2.64	.34	2.21	1.44
1960 -----	9.09	1.10	3.19	1.14
1961 -----	4.40	.43	.22	.52
1962 -----	3.04	.63	1.64	.30
1963 -----	7.76	1.81	.95	.15
1964 -----	6.37	.41	.95	1.15
Other water areas:				
1959 -----	.43	.88	.73	1.04
1960 -----	.59	1.18	.84	1.05
1961 -----	.40	.98	.51	.96
1962 -----	.53	1.08	1.09	.59
1963 -----	.56	.99	.82	.66
1964 -----	.64	.79	.74	.69
Total:				
1959 -----	3.50	1.86	4.04	3.69
1960 -----	10.03	2.79	4.94	3.98
1961 -----	5.07	1.96	1.83	2.31
1962 -----	3.81	2.30	3.82	1.79
1963 -----	8.61	3.52	2.91	1.55
1964 -----	7.52	1.78	1.54	2.95
Percent change, 1964 from 1963	-13	-51	-47	+90

TABLE B-31. --Canada goose breeding population,
by areas, Montana, 1963 and 1964

	Hi-Line	Helena	East Slope
Pairs:			
1963 -----	575	101	295
1964 -----	701	62	314
Singles:			
1963 -----	155	61	104
1964 -----	63	31	100
Groups:			
1963 -----	134	139	182
1964 -----	136	17	75
Total:			
1963 -----	1,439	402	876
1964 -----	1,601	172	803

TABLE B-32. --Duck breeding populations, Montana, 1963 and 1964

	Sheridan County	Hi-Line		Great Falls- Piedmont	Total
		Eastern	Central		
Total area (sq. mi.) -----	1,440	7,926	9,468	7,020	25,854
Area sampled (sq. mi.) -----	38	172	94	143	447
Ducks per sq. mi. :					
15 year average -----	27.0	5.1	10.7	8.2	9.1
1963 -----	36.2	6.9	10.6	3.9	9.2
1964 -----	32.8	5.9	11.8	6.7	9.7
Population index:					
1963 -----	52,128	54,689	100,361	27,378	234,556
1964 -----	47,232	46,763	111,722	47,034	252,751
Percent change, 1964 from 1963 -----	-9	-14	+11	+72	+8

TABLE B-33. --May and July pond indexes by strata, (North Dakota, South Dakota, and Minnesota), 1959 to 1964

[Index numbers in thousands]

Year	Stratum			Total
	East	Central	West	
May:				
1959 -----	162	109	41	313
1960 -----	223	397	52	672
1961 -----	151	105	33	289
1962 -----	313	348	72	732
1963 -----	375	413	80	868
1964 -----	193	207	60	460
Average, 1959-64 -----	236	263	56	555
Percent change, 1964 from--				
1963 -----	-18.2	-21.3	+7.1	-17.1
Average -----	-48.5	-49.9	-25.0	-47.0
July:				
1959 -----	213	110	73	396
1960 -----	309	311	116	736
1961 -----	166	108	77	351
1962 -----	281	231	68	579
1963 -----	245	275	99	619
1964 -----	154	211	70	435
Average, 1963-64 -----	227	239	79	544
Percent change, 1964 from--				
1963 -----	-32.2	-11.7	-11.4	-20.0
Average -----	-37.1	-23.3	-29.3	-29.7

Note:--Due to a change in recording water areas in 1962, 1962 July pond index is not comparable to previous counts.

TABLE B-34. --Waterfowl breeding populations, by species and stratum, North Dakota, South Dakota, and western Minnesota, 1963 and 1964

[Index numbers in thousands]

Species	Stratum			Total		Average 1959 to 1964	Percent change from--	
	East	Central	West	1963	1964		1963	Average
Ducks:								
Dabblers:								
Mallard -----	92	163	38	480	293	286	-38.8	+2.4
Gadwall -----	15	38	6	163	59	60	-64.4	-1.7
American widgeon -	1	2	--	4	3	10	--	-70.0
Green-winged teal -	--	--	--	1	--	--	--	--
Blue-winged teal --	66	224	19	324	309	214	-4.3	+44.4
Shoveler -----	16	41	9	140	66	92	-52.1	-28.3
Pintail -----	23	60	3	165	86	147	-47.3	-41.5
Subtotal -----	213	528	75	1,276	816	809	-35.8	+ .9
Divers:								
Redhead -----	22	23	--	39	45	25	+17.9	+80.0
Canvasback -----	5	16	--	17	21	12	+16.7	+75.0
Scaup -----	3	2	--	57	5	31	-91.2	-83.9
Ring-necked duck -	--	--	--	9	--	2	--	--
Ruddy duck -----	--	2	--	13	2	8	+84.6	-75.0
Subtotal -----	30	43	--	135	73	78	-45.6	-6.4
Total ducks -----	243	571	75	1,411	889	887	-36.8	+12
Coots -----	36	31	--	95	67	92	-29.5	-27.2
Grand total -----	279	602	75	1,506	956	979	--	--

TABLE B-35. --Lone drake index, North Dakota, South Dakota, and western Minnesota, 1959 to 1964

Year	Percent of total
May:	
1959-----	41.5
1960-----	73.3
1961-----	67.1
1962-----	73.9
1963-----	77.7
1964-----	67.6

TABLE B-36. --Waterfowl brood and late-nesting indexes by stratum compared with previous year and long-term averages, North Dakota, South Dakota, and western Minnesota, 1964

[Index numbers in thousands]

Species	Stratum			Total		Average	Percent change from--	
	East	Central	West	1963	1964	1959-64	1963	Average
Broods:								
Ducks brood index -----	11.6	18.1	2.0	108.1	31.7	62.8	-70.7	-49.5
Average brood size ¹ -----	6.2	8.0	5.5	5.2	6.0	4.9	+15.4	+22.4
Coot brood index -----	.0	2.9	.0	4.4	2.9	3.5	-34.0	-17.1
Late-nesting index: ²								
Dabblers:								
Mallard -----	4.9	14.0	4.5	30.8	23.4	29.7	-24.0	-21.2
Gadwall -----	1.2	8.0	--	10.1	9.2	7.2	-8.9	+27.8
American widgeon -----	--	--	--	1.3	--	.5	--	--
Green-winged teal -----	--	--	--	.4	--	.1	--	--
Blue-winged teal -----	8.5	19.6	2.0	17.4	30.1	20.9	+73.0	+44.0
Shoveler -----	--	1.8	--	--	1.8	.7	--	+157.1
Pintail -----	--	--	--	3.3	--	4.6	--	--
Subtotal -----	14.6	43.4	6.5	63.3	64.5	63.7	+1.9	+1.3
Divers:								
Redhead -----	1.2	1.3	--	4.7	2.5	2.9	-46.8	-13.8
Canvasback -----	--	.4	--	--	.4	.2	--	+100.0
Scaup -----	--	--	--	--	--	.4	--	--
Ring-necked duck -----	--	--	--	--	--	.8	--	--
Ruddy duck -----	1.2	1.4	--	16.4	2.6	7.4	-84.1	-64.9
Subtotal -----	2.4	3.1	--	21.1	5.5	11.7	-73.9	-53.0
Total -----	17.0	46.5	6.5	84.4	70.0	75.4	-17.0	-7.2

¹ Class II and III broods only.

² As indicated by adult pairs and singles.

**TABLE B-37. --Statewide breeding population
species composition, Nebraska,
1963 and 1964**

Species	1964	1963	Change
Ducks:			
Dabblers:			
Mallard -----	69,120	38,641	+30,479
Gadwall -----	3,456	17,235	-13,779
American widgeon -----	751	147	+604
Blue-winged teal -----	23,043	36,643	-13,600
Shoveler -----	5,380	5,078	+302
Pintail -----	21,886	11,873	+10,013
Subtotal -----	123,636	109,617	
Divers:			
Redhead -----	4,604	2,664	+1,940
Canvasback -----	2,519	1,104	-4,415
Scaup -----	5,698	1,104	-4,594
Ruddy duck -----	882	5,316	-4,434
Subtotal -----	13,703	10,188	
Total -----	137,339	119,805	+17,535

**TABLE B-38. --Aerial duck production
data, Nebraska Sandhills, 1964**

	Stratum		Total
	A	B	
Number of Transects ----	48	16	64
Square miles sampled ---	108	36	144
Square miles in stratum --	10,869	5,363	16,232
Number of broods seen ---	64	17	75

**TABLE B-39. --Duck brood composition, aerial
survey, Nebraska Sandhills, 1964**

Age class	Broods	Ducklings	Average brood
Class I -----	4	17	
Class II -----	27	114	
Class III -----	32	164	
Total -----	63	295	4.68

TABLE B-40. --Waterfowl breeding pairs,
Wyoming, 1963 and 1964

Species	Number of adult pairs		Percent change from 1963	Percent change from 1955-63 average	Total duck index		Percent change from 1963	Percent change from 1955-63 average
	1963	1964			1963	1964		
Ducks:								
Dabblers:								
Mallard -----	71,024	53,575	-25	-1	149,517	111,063	-26	-5.7
Gadwall -----	5,025	10,585	+111	+149	10,049	21,623	+115	+148
American widgeon --	4,669	5,267	+13	+34.9	11,815	10,534	-11	+15.1
Teal -----	7,740	10,384	+34	+44.1	19,012	27,540	+45	+64.1
Shoveler -----	2,580	7,409	+187	+167	6,518	22,423	+244	+241
Pintail -----	20,506	17,758	-13	+21.5	42,506	37,924	-11	+20.1
Divers:								
Redhead -----	407		--	--	407		--	--
Canvasback -----	407	605	+51	+107	407	1,210	+197	+242
Scaup -----	--		--	--	--		--	--
Goldeneye -----	407	605	+51	-34.2	407	1,210	+197	+287
Ruddy duck -----	--		--	--	--		--	--
Miscellaneous:								
Merganser -----	3,531	605	-83	-76.3	8,556	1,210	-86	-80.4
Unidentified -----	6,383	8,770	+37	+91.3	46,851	65,464	+40	+93.4
Coots -----	815	752	-8	-52.8	1,630	1,504	-8	-48.9
Total -----	123,493	116,315	-6	+20.5	297,675	301,705	+1	+28.8

TABLE B-41. --Canada goose breeding pairs, by area, Wyoming, 1963 and 1964

Area	1963	1964	Percent change from 1963	Percent change from 9-year average
Snake River -----	441	379	-14	+5
Bear River -----	757	747	-1	+95
Green River -----	478	432	-10	+60
North Platte River -----	312	348	+12	+44
Wind River -----	182	199 ¹	+9	+60
Big Horn River -----	25	40 ¹	+60	+60
Total -----	2,195	2,145	-2	+53

¹ Estimated

TABLE B-42. --Duck breeding-ground population estimates,
Colorado, 1963 and 1964

Area	Breeding pairs		
	1963	1964	10-year average, 1954-1964
San Luis Valley -----	17,377	19,063	10,721
North Park -----	5,278	11,000	3,927
South Platte Valley -----	10,513	10,517	3,528
Cache la Poudre Valley -	2,276	2,381	1,721
Yampa Valley-----	3,494	2,613	3,024
Brown's Park-----	60	115	110
Total	38,998	45,689	23,031

TABLE B-43. --Species composition of breeding duck population, Colorado, 1963 and 1964

Species	Number			Percent		
	1963	1964	1954-1963 average	1963	1964	1954-1963 average
Dabblers:						
Mallard -----	31,026	30,077	15,185	79.9	65.9	65.9
Mexican duck-----	--	--	--	--	--	--
Gadwall -----	1,358	2,298	1,945	3.4	5.0	8.4
American widgeon -----	76	834	249	0.2	1.8	1.1
Green-winged teal -----	242	475	456	0.6	1.0	2.0
Blue-winged teal -----	3,718	3,375	1,315	9.4	7.4	5.7
Cinnamon teal -----	369	363	598	0.9	0.8	2.6
Shoveler -----	471	1,413	652	1.2	3.1	2.8
Pintail -----	838	3,732	1,386	2.1	8.2	6.0
Wood duck-----	--	--	--	--	--	--
Divers:						
Redhead -----	554	2,558	689	1.4	5.6	3.0
Canvasback-----	--	2	21	--	Trace	0.1
Scaup -----	2	194	335	Trace	0.4	1.5
Ring-necked duck -----	--	--	--	--	--	--
Bufflehead-----	--	11	2	--	Trace	Trace
Ruddy duck -----	--	--	62	--	--	0.3
Miscellaneous:						
Merganser -----	317	357	133	0.8	0.8	0.6
Total -----	38,998	45,689	23,028	100.0	100.0	100.0

TABLE B-44.--Number of Canada geese by breeding classification, Moffat County, Colorado, 1964

Area	Nesting pairs	Non-breeding pairs	Goslings (estimate ¹)	Groups	Total	Percent change from--	
						1963	Average
Yampa:							
Craig to Juniper Springs -----	20	17	114	73	261		
Juniper to Cross Mountain-----	13	11	71	9	128		
Lily Park -----	22	9	105	28	195		
Subtotal -----	55	37	290	110	584	+25	+174
Green (Brown's Park)-----	--	14	--	23	51	+240	-7
Little Snake (25 mi. up-stream from lower bridge)-----	25	37	137	58	319	+105	+177
Total -----	80	88	427	191	954	+49	+149

¹Includes both eggs and goslings.

TABLE B-45.--Waterfowl breeding populations, by stratum, northern Saskatchewan, northern Manitoba, and western Ontario, May 1963 and 1964

[Index numbers, in thousands]

Species	Ontario C	Stratum				Total		Percent change
		Manitoba		Saskatchewan C		1963	1964	
		D	C	South ¹	North			
Ducks:								
Dabblers:								
Mallard -----	56	30	47		59	179	192	+7.3
Black duck -----	25	--	2		2	25	30	+20.0
Gadwall -----	1	5	--		2	8	9	+12.5
American widgeon ---	4	8	9		12	24	33	+37.5
Green-winged teal ---	6	1	3		8	10	19	+90.0
Blue-winged teal ---	1	12	--		23	30	37	+23.3
Shoveler -----	--	13	1		12	12	26	+116.7
Pintail -----	2	10	3		7	20	21	+5.0
Subtotal -----	95	79	65		125	308	367	+14.8
Divers:								
Redhead -----	--	8	1		8	10	17	+70.0
Canvasback -----	--	9	4		23	31	37	+19.4
Scaup -----	42	39	44		72	256	197	-23.1
Ring-necked duck ---	15	6	19		5	120	45	-62.5
Goldeneye -----	19	1	1		2	47	23	-51.1
Bufflehead -----	1	2	--		6	27	9	-66.7
Ruddy duck -----	--	--	--		--	4	1	-75.0
Subtotal -----	77	65	69		116	495	329	-33.5
Miscellaneous:								
Scoter -----	--	1	2		5	23	8	-65.2
Merganser -----	60	7	30		12	166	109	-34.3
Subtotal -----	60	8	32		17	189	117	-38.1
Total ducks -----	232	152	166		258	992	813	-19.1
Canada geese -----	25	--	1		--	31	27	-12.9
Coots -----	--	16	--		3	18	17	-5.6

¹Area not flown in 1964.

TABLE B-46. --Duck broods, by class and stratum, northern Saskatchewan, northern Manitoba, and western Ontario 1963 and 1964

Year and class	Stratum					Total broods	Percent of year's total
	Ontario C	Manitoba		Saskatchewan C			
		C	D	South	North		
1963:							
Class I -----	4	2	10	11	--	27	12
Class II -----	27	29	58	59	8	181	80
Class III -----	3	7	1	6	2	19	8
1964:							
Class I -----	5	3	21	14	3	49	11
Class II -----	26	50	98	104	14	292	71
Class III -----	4	21	13	25	9	72	18

TABLE B-47. --Production survey indexes, by stratum, northern Saskatchewan, northern Manitoba, and western Ontario, July, 1955 to 1964

[Index numbers, in thousands]

Year	Ontario C	Stratum				Total
		Manitoba		Saskatchewan C		
		C	D	South	North	
Number of young: ¹						
1955-----	--	59	30	46	80	215
1956-----	--	2	7	11	86	106
1959-----	--	25	20	62	58	165
1960-----	60	45	26	26	56	213
1961-----	116	47	37	38	65	303
1962-----	173	52	24	68	77	394
1963-----	129	64	52	144	92	481
1964-----	114	97	84	230	235	760
Late-nesting index: ²						
1955-----	--	29	10	11	13	63
1956-----	--	2	7	5	28	42
1959-----	--	9	4	9	17	39
1960-----	22	9	6	8	17	62
1961-----	6	8	16	9	12	51
1962-----	100	30	58	82	29	299
1963-----	124	49	29	65	64	359
1964-----	60	44	39	58	66	267

¹Number of broods multiplied by average brood size.

²As indicated by adult pairs and singles.

TABLE B-48. --May and July pond indexes, southern Manitoba, 1953 to 1964

[Indexes numbers, in thousands]

Year	Stratum		Total
	A	B	
May:			
1953-----	187	312	499
1954-----	258	1,075	1,333
1955-----	315	428	743
1956-----	391	615	1,006
1957-----	262	404	666
1958-----	352	264	616
1959-----	160	482	642
1960-----	324	295	619
1961-----	158	263	421
1962-----	135	295	430
1963-----	298	331	629
1964-----	398	331	729
Average 1953 to 1963	258	436	691
Percent change, from 1963-----	+34	--	+16
Average -----	+54	-24	+5
July:			
1954-----	473	384	857
1955-----	399	271	610
1956-----	425	411	836
1957-----	241	260	501
1958-----	163	341	504
1959-----	96	325	420
1960-----	164	212	376
1961-----	41	86	129
1962-----	97	135	232
1963-----	145	178	323
1964-----	201	182	383
Average 1954 to 1963	218	260	478
Percent change, from 1963-----	+39	+2	+19
Average -----	-8	-30	-20

TABLE B-49. --Waterfowl breeding population index, southern Manitoba, 1963 and 1964

Species	Stratum		Total		Average 1953 to 1963	Percent change from	
	A	B	Previous year	Current year		1963	Average
Ducks:							
Dabblers:							
Mallard -----	73,800	93,200	182,000	167,000	308,000	-8.2	-45.8
Black duck -----	200	--	1,400	200	200	-85.7	-85.7
Gadwall -----	7,700	3,100	14,300	10,800	7,800	-24.5	+38.5
American widgeon -----	11,400	8,600	15,200	20,000	22,700	+31.6	-11.9
Green-winged teal -----	300	--	4,700	300	3,700	-93.6	-91.9
Blue-winged teal -----	33,700	4,500	47,000	38,200	76,800	-18.7	-50.3
Shoveler -----	26,300	11,700	33,300	38,000	29,200	+14.1	+30.1
Pintail -----	30,500	11,100	61,700	41,600	76,800	-32.6	-45.9
Wood duck -----	--	--	--	--	--	--	--
Subtotal -----	183,900	132,200	359,600	316,100	525,200	-12.1	-39.8
Divers:							
Redhead -----	13,600	18,300	33,800	31,900	20,500	-5.6	+55.6
Canvasback -----	20,700	17,300	30,500	38,000	30,700	+24.6	+23.8
Scaup -----	31,100	41,200	55,700	72,300	74,700	+29.8	-3.2
Ring-necked duck -----	1,200	600	6,800	1,800	4,700	-73.5	-61.7
Goldeneye -----	700	1,100	1,100	1,800	4,000	+63.6	-55.0
Bufflehead -----	1,400	2,500	5,400	3,900	3,400	-27.8	+14.7
Ruddy duck -----	10,700	900	14,600	11,600	9,300	-20.5	+24.7
Subtotal -----	79,400	81,900	147,900	161,300	147,300	+9.1	+9.5
Miscellaneous:							
Scoter -----	100	500	400	600	500	+150.0	20.0
Merganser -----	900	3,100	--	4,000	100		+4,000.0
Subtotal -----	1,000	3,600	400	4,600	600	+1,150.0	+767.0
Total ducks -----	264,300	217,700	507,900	482,000	673,100	-5.1	-28.4
Geese:							
Canada goose -----	--	--	--	--	--	--	--
Coots -----	45,000	11,200	54,400	56,200	56,300	+3.3	+3.3
Grand total -----	309,300	228,900	562,300	538,200	729,400	+4.3	-26.2

TABLE B-50. --Species breeding composition percentage, southern Manitoba, 1960 to 1964

Species	1960	1961	1962	1963	1964
Ducks:					
Dabblers:					
Mallard -----	27.1	28.1	29.0	25.1	34.9
Gadwall -----	3.5	6.0	4.4	3.3	2.3
American widgeon -----	4.2	5.1	5.8	4.8	4.6
Green-winged teal -----	1.4	1.7	1.3	1.8	Trace
Blue-winged teal -----	19.8	24.8	19.3	28.3	8.0
Shoveler -----	8.0	8.4	8.2	8.4	8.0
Pintail -----	16.2	11.6	11.1	11.1	8.7
Subtotal -----	80.4	85.7	79.1	82.8	66.5
Divers:					
Redhead -----	6.3	3.9	6.1	4.7	6.7
Canvasback -----	3.8	3.0	5.9	3.9	7.9
Scaup -----	4.6	3.7	5.2	4.8	15.1
Ring-necked duck -----	1.8	0.7	1.3	0.5	0.4
Goldeneye -----	0.6	0.1	0.3	0.2	0.4
Bufflehead -----	0.3	0.4	0.4	0.3	0.8
Ruddy duck -----	2.6	2.3	1.6	2.7	2.4
Subtotal -----	19.8	14.1	20.8	17.1	33.5
Total -----	100.2	99.8	99.9	99.9	100.0

TABLE B-51. --Lone drake index,
southern Manitoba, 1953 to 1964[Expressed as percentage of
total drakes]

Year	Percent lone drakes ¹
1953-----	70.1
1954-----	79.6
1955-----	87.5
1956-----	79.4
1957-----	89.2
1958-----	81.9
1959-----	70.0
1960-----	86.5
1961-----	67.5
1962-----	62.0
1963-----	83.7
1964-----	78.1

¹Includes only mallards,
pintails, and canvasback.

TABLE B-52. --Waterfowl population summary,
southern Manitoba, July 1964

	Stratum A	Stratum B	Strata A and B
Area in square miles -----	10,368	28,600	38,968
Lineal miles in sample -----	1,578	636	2,214
Square miles in waterfowl sample----	197.25	79.5	276.75
Expansion factor -----	52.563	359.75	--
Broods:			
Broods seen -----	233	36	269
Brood indexes -----	12,200	13,000	25,200
Broods per square mile-----	1.18	.45	.65
Late nesters:			
Late nesters seen-----	346	42	388
Late nesting index -----	18,200	15,100	33,300
Late nesters per square mile----	1.8	.50	.85
Coots:			
Coot broods seen -----	162	12	174
Coot brood index -----	8,500	4,300	12,800
Coot broods per square mile ----	.80	.15	.33
Ponds:			
Ponds seen -----	3,823	506	4,329
Pond index -----	201,000	182,000	383,000
Ponds per square mile -----	19.4	6.4	9.8

Note: Transects B 9 and 10 not flown.

TABLE B-53. --Waterfowl brood and late-nesting indexes, by stratum compared with previous year and long-term average, southern Manitoba, 1964

[Index numbers in thousands]

Species	Stratum		Total		Average 1954 to 1963	Percent change from	
	A	B	1963	1964		Previous year	Average
Broods:							
Duckbrood index -----	12.2	13.0	32.3	25.2	34.5	-22	-27
Average brood size ¹ --	5.4	4.5	5.4	5.0	5.6	-8	-11
Coot brood index -----	8.5	4.3	3.5	12.8	7.2	+266	+78
Late-nesting index ² :							
Dabblers:							
Mallards -----	4.7	4.3	13.3	9.0	16.5	-32	-45
Gadwall -----	0.7	--	2.1	0.7	1.3	-67	-46
American widgeon ---	1.2	--	4.3	1.2	3.2	-72	-62
Green-winged teal ---	0.1	--	0.1	0.2	0.5	-50	-80
Blue-winged teal ---	2.1	3.2	2.6	5.3	7.8	+104	-32
Shoveler -----	0.4	5.1	0.2	5.5	0.8	+1750	+588
Pintail -----	0.3	--	2.2	0.3	2.5	-86	-88
Subtotal -----	19.5	12.6	24.9	22.1	32.6	-11	-32
Divers:							
Redhead -----	0.4	1.4	0.7	1.8	1.5	+157	+20
Canvasback -----	0.3	--	1.1	0.3	1.2	-73	-75
Scaup -----	2.5	--	1.7	2.5	3.4	+47	-26
Ring-necked duck ---	--	--	0.2	--	0.7	--	--
Goldeneye -----	0.1	--	0.2	0.1	0.3	-50	-67
Bufflehead -----	0.1	--	0.2	0.1	0.5	-50	-80
Ruddy duck -----	5.2	1.1	8.0	6.3	4.8	-21	+31
Subtotal -----	8.6	2.5	12.1	11.1	12.4	-8	-10
Miscellaneous -----	0.1	--	--	0.1	0.2	+100	-50
Total ducks -----	18.2	15.1	37.0	33.3	45.2	-10	-26

¹ Class II and III broods only.

² As indicated by adult pairs and singles.

TABLE B-54. --Percentage age-class distribution of duck broods, by stratum, southern Manitoba, 1954 to 1964

Year	Stratum A			Stratum B			Total		
	Class I	Class II	Class III	Class I	Class II	Class III	Class I	Class II	Class III
1954 -----	61.5	33.5	5.0	62.9	20.0	17.1	62.2	26.4	11.4
1955 -----	41.9	30.2	27.9	17.4	43.5	39.1	29.9	36.7	33.4
1956 -----	31.2	41.6	27.2	17.6	50.0	32.4	29.4	42.8	27.8
1957 -----	29.2	43.2	27.6	28.1	56.1	15.8	29.1	44.4	26.5
1958 -----	51.7	34.5	13.8	45.2	45.2	9.7	51.2	35.4	13.5
1959 -----	60.4	32.7	6.8	63.0	34.8	2.2	60.8	33.0	6.2
1960 -----	47.4	45.4	7.2	41.0	54.1	4.9	45.9	47.5	6.7
1961 -----	35.6	50.0	14.4	28.8	59.1	12.1	30.9	56.3	12.8
1962 -----	40.2	50.5	9.2	42.3	42.3	15.4	40.6	48.7	10.7
1963 -----	9.5	44.4	46.1	16.6	41.7	41.7	11.0	43.8	45.2
1964 -----	36.3	52.5	11.2	27.6	58.6	13.8	35.2	53.2	11.6

TABLE B-55. --Waterfowl breeding population, by area and year, Chippewa National Forest, Minnesota, 1963 and 1964

AREA	1963	1964	Percent change
Bowstring -----	238	245	+3
Burns -----	107	118	+10
Kitchie -----	112	204	+82
Lower Pigeon -----	117	85	-27
Mud Lake -----	251	141	-44
Raven Lake -----	17	11	-35
Round Lake -----	327	729	+123
Third River -----	141	184	+30
Lake Winnibigoshish --	568	309	-45
Rabideau Lake -----	247	247	--
Total -----	2,125	2,273	+7

TABLE B-56. --Species composition, Chippewa National Forest, Minnesota, 1963 and 1964

SPECIES	1963	1964
Mallard -----	52	43
American widgeon ----	8	12
Blue-winged teal -----	11	18
Wood duck -----	13	13
Ring-necked duck ----	1	3
Goldeneye -----	12	16
Other -----	3	1

TABLE B-57. --Duck production ratios, Chippewa National Forest, Minnesota, 1963 and 1964

Species	1963			1964		
	Adults	Juveniles	Ratio	Adults	Juveniles	Ratio
Mallard -----	373	730	1:1.9	524	643	1:1.2
American widgeon ----	53	127	1:2.3	123	158	1:1.3
Blue-winged teal ----	39	186	1:4.7	58	147	1:2.5
Wood duck -----	65	204	1:3.1	108	185	1:1.7
Ring-necked duck ----	8	30	1:3.7	26	47	1:1.8
Goldeneye -----	32	214	1:6.7	95	281	1:2.9
Other -----	25	39	1:5.0	3	29	1:9.6
Total -----	595	1,530	1:2.5	937	1,490	1:1.6

TABLE B-58. --Duck breeding population index, Michigan, 1963 and 1964

Year	Lineal miles censused	Potential breeders per lineal mile	
		Wood duck	All species
1963-----	128.5	2.03 ¹	20.10
1964-----	137.4	1.60	17.09

¹Lineal miles for wood duck was 137.4

TABLE B-59. --Duck production index, Michigan, 1963 and 1964

Year	Number per lineal mile			Average brood size
	Broods	Hens and young	Lone drakes	
1951 -----	0.35	2.20	3.31	5.76
1952 -----	.70	3.92	3.21	4.60
1953 -----	.51	3.63	4.32	6.10
1954 -----	.20	1.67	4.60	6.24
1955 -----	.64	4.65	5.09	6.28
1956 -----	.53	3.67	4.40	5.86
1957 -----	.38	2.30	4.80	5.10
1958 -----	.31	2.18	6.50	5.97
1959 -----	.66	4.00	12.58	5.06
1960 -----	.33	2.48	14.49	6.50
1961 -----	.67	3.80	7.71	5.64
1962 -----	.87	5.64	8.48	5.60
1963 -----	1.08	6.82	6.06	5.33
1964 -----	.80	5.83	8.77	5.76

¹Average wood duck brood size was 6.5

TABLE B-60. --Comparison of duck broods, Wisconsin, 1964

Species and class	1964			1950-56 ¹	
	Number broods	Number young	Average number young brood	Average number young brood	Number broods
Mallard:					
Age class I -----	15	105	7.0	7.5	64
Age class II -----	31	229	7.4	6.8	147
Age class III -----	16	86	5.4	6.4	112
Blue-winged teal:					
Age class I -----	9	63	7.0	7.8	119
Age class II -----	14	92	6.6	7.2	167
Age class III -----	2	2	2	6.6	48
Wood duck:					
Age class I -----	8	57	7.1	8.3	23
Age class II -----	20	129	6.5	7.1	32
Age class III -----	8	46	5.8	5.3	23

¹ Duck and Coot Ecology and Management in Wisconsin, 1964, Jahn, L. R., and R. A. Hunt, Wisconsin Conservation Department Technical Bulletin (In Press).

² Insufficient data available.

TABLE B-61. --Wood duck broods observed by stream section and age class, Indiana, 1964

Stream area	Miles of transect	Date censused 1964	Number of broods						Total		Percent change from 1963
			Age class I			Age class II					
			A	B	C	A	B	C	1963	1964	
Maumee -----	15	5/21	--	3	2	1	2	1	13	9	-30.8
Elkhart -----	17	5/20	--	2	1	--	1	--	7	4	-42.9
Iroquois -----	14	6/3	--	1	1	1	--	--	5	3	-40.0
Minnissinewa-----	13	5/22	1	3	2	--	1	--	5	7	+40.0
Big Blue -----	12	5/27	--	--	1	1	--	--	13	2	-84.6
White, West Fork--	25	5/26	1	--	4	1	1	--	16	7	-56.3
Muscatatuck -----	19	6/4	--	--	2	2	2	--	56	6	-89.3
Salt Creek-----	15	6/3	--	3	6	2	--	1	26	12	-53.8
Eel River -----	13	6/2	--	--	2	3	1	1	9	7	-22.2
Total -----	143		2	12	21	11	8	3	150	57	-62.0

**TABLE B-62. --Wood duck nesting effort and production data, Missouri,
1963 and 1964**

	1963	1964	Percent change from 1963
Lake and marsh censused (acres) -----	10,938	10,955	
Streams censused (miles) -----	743	730	
Wood duck:			
Nesting effort:			
Per sq. mile of lake and marsh -----	12.7	6.0	-52.8
Per mile of stream-----	.33	.32	-3.0
Number of broods (stream) -----	122	105	-13.9
Broods per mile (stream) -----	.16	.14	-12.5
Number of broods (marsh) -----	42	25	-40.4
Broods per sq. mi. (marsh) -----	2.5	1.5	-40.0
Average number of ducklings			
Class I -----	6.6	6.5	-1.5
Class II -----	7.1	5.5	-22.5
Class III -----	5.1	4.2	-17.6

TABLE B-63. --Number of water bodies, southwest Manitoba, May 1963 and 1964

Area	1963	1964	Percent change 1963-1964
Streams -----	45	45	0
Dugouts -----	56	52	+13
Field (sheet) water -----	221	344	+56
Other -----	1,382	1,657	+11
Total -----	1,694	2,088	+23
Water areas/sq. mi. ---	21.7	26.9	

**TABLE B-64. --Waterfowl breeding population, southwest Manitoba,
May 1963 and 1964**

Species	1963	1964	Percent change from 1963
Ducks:			
Dabblers:			
Mallard -----	332	375	+13
Gadwall -----	43	92	+111
American widgeon -----	64	75	+17
Green-winged teal -----	24	35	+46
Blue-winged teal -----	374	651	+74
Shoveler -----	111	243	+112
Pintail -----	147	239	+63
Subtotal -----	1,095	1,710	+56
Divers:			
Redhead -----	53	107	+102
Canvasback -----	58	99	+71
Scaup -----	64	70	+25
Ring-necked duck -----	6	19	+317
Goldeneye -----	3	14	+467
Bufflehead -----	4	4	--
Ruddy duck -----	35	34	-3
Subtotal -----	223	347	+55
Unidentified ducks -----	--	4	--
Total ducks -----	1,318	2,061	+56

TABLE B-65. --Lone drake index, southwest Manitoba, 1960 to 1964

[Expressed as percentage of total drakes]

Year	Mallard	Pintail	Canvasback
May:			
1960 -----	--	--	78
1961 -----	45	34	--
1962 -----	57	72	42
1963 -----	75	67	73
1964 -----	69	65	61

TABLE B-66. --Waterfowl breeding population, Alberta, 1963 and 1964

Species	Total		10-Year Average	Percent change from--	
	1963	1964		1963	Average
Ducks:					
Dabblers:					
Mallard -----	1,265	1,146	1,695	-9	-32
Gadwall -----	224	292	211	+30	+38
American widgeon --	311	360	427	+16	-16
Green-winged teal --	137	131	122	--	+7
Blue-winged teal ¹ --	421	617	708	+47	-13
Shoveler -----	404	432	525	+7	-18
Pintail -----	767	579	1,808	-25	-68
Subtotal -----	3,529	3,557	5,496	+8	-35
Divers:					
Redhead -----	111	163	136	+47	+20
Canvasback -----	180	143	125	-21	+14
Scaup -----	787	667	673	-15	--
Ring-necked duck ---	1	--	--	--	--
Goldeneye -----	36	11	--	-69	--
Bufflehead -----	37	23	--	-38	--
Ruddy duck -----	132	90	54	-32	+67
Subtotal -----	1,284	1,097	988	-15	+11
Miscellaneous:					
Scoter -----	6	32	--	+433	--
Unidentified -----	9	9	--	--	--
Total ducks -----	4,828	4,695	6,484	-3	-28
Water areas (per sq. mi.) -----	8.8	5.6	8.4	-36	-33

¹ Includes cinnamon teal.

TABLE B-67. --Waterfowl breeding population, Saskatchewan, 1963 and 1964

Species	Total		Percent change from-- 1963
	1963	1964	
Ducks:			
Dabblers:			
Mallard -----	656	403	-39
Gadwall -----	193	95	-51
American widgeon -----	184	151	-18
Green-winged teal -----	15	15	--
Blue-winged teal -----	204	257	+26
Shoveler -----	240	209	-13
Pintail -----	458	314	-31
Subtotal -----	1,950	1,444	-26
Divers:			
Redhead -----	35	49	+40
Canvasback -----	40	50	+25
Scaup -----	90	101	+12
Subtotal -----	165	200	+21
Unidentified -----	17	12	--
Total ducks -----	2,132	1,656	-22
Water areas (per sq. mi.) -----	6.9	7.0	--

TABLE B-68. --Waterfowl population indexes, eastern Ontario, Quebec, and Labrador, 1963 and 1964

Species	1963	1964
Ducks:		
Dabblers:		
Mallard -----	47,200	25,300
Black duck -----	274,700	219,900
American widgeon ----	4,000	5,700
Green-winged teal ----	27,700	9,000
Blue-winged teal ----	--	2,600
Pintail -----	19,500	10,800
Wood duck -----	--	3,900
Subtotal -----	373,100	277,200
Divers:		
Redhead -----	--	--
Canvasback -----	500	--
Scaup -----	39,400	41,300
Ring-necked duck ----	28,300	15,400
Goldeneye -----	77,300	166,000
Bufflehead -----	64,100	15,100
Ruddy duck-----	--	--
Subtotal -----	209,600	237,800
Miscellaneous:		
Scoter -----	50,600	7,600
Merganser -----	346,000	421,500
Oldsquaw -----	--	3,200
Subtotal -----	396,600	432,300
Total ducks -----	979,300	947,300
Canada goose -----	122,500	70,400
Total waterfowl ----	1,101,800	1,017,700

TABLE B-69. --Percent lone drakes, eastern Ontario, Quebec, and Labrador, 1963 and 1964

	1963	1964
Mixed boreal -----	23.0	65.8
Main boreal -----	41.2	63.6
Open boreal and forest tundra -	47.6	78.6
Average (all strata) -----	38.8	68.7

**TABLE B-70. --Waterfowl population indexes by strata, eastern Ontario, Quebec,
and Labrador, 1963 and 1964**

Species	Mixed boreal		Main boreal		Open boreal and forest tundra	
	1963	1964	1963	1964	1963	1964
Ducks:						
Dabblers:						
Mallard -----	19,200	10,100	23,300	11,000	4,700	4,200
Black duck -----	22,500	36,800	111,900	68,500	140,300	114,600
American widgeon -----	3,300	--	700	1,500	--	4,200
Green-winged teal -----	16,400	1,800	6,600	3,000	4,700	4,200
Blue-winged teal -----	--	2,600	--	--	--	--
Pintail -----	2,800	4,100	6,300	4,600	10,400	2,100
Wood duck -----	--	1,600	--	2,300	--	--
Subtotal -----	64,200	57,000	148,800	90,900	160,100	129,300
Divers:						
Redhead -----	--	--	--	--	--	--
Canvasback -----	500	--	--	--	--	--
Scaup -----	12,300	10,400	16,700	13,000	10,400	17,900
Ring-necked duck -----	3,300	2,100	18,400	3,800	6,600	9,500
Goldeneye -----	4,300	3,600	20,900	36,200	52,100	126,200
Bufflehead -----	7,200	1,600	37,900	3,000	19,000	10,500
Ruddy duck -----	--	--	--	--	--	--
Subtotal -----	27,600	17,700	93,900	56,000	88,100	164,100
Miscellaneous:						
Scoter -----	--	500	4,200	800	46,400	6,300
Merganser -----	21,500	32,600	86,600	138,600	237,900	250,300
Oldsquaw -----	--	--	--	--	--	3,200
Subtotal -----	21,500	33,100	90,800	139,400	284,300	259,800
Total ducks -----	113,300	107,800	333,500	286,300	532,500	553,200
Canada goose -----	--	--	26,800	4,200	95,700	66,200
Total waterfowl -----	113,300	107,800	360,300	290,500	628,200	619,400

TABLE B-71.--Waterfowl brood and late-nesting indexes by Strata compared with previous year for eastern Ontario, Quebec, and Labrador, 1964

[Index numbers in thousands]

Species	Stratum					Total		Percent change from 1963
	Mixed boreal	Main boreal	Open boreal	Forest tundra	Tundra	Previous year	Current year	
Broods:								
Duck brood index -----	2	37	5	1	1	150	46	-69
Average brood size -----	5.33	5.46	4.83	4.75	3.00	5.24	5.04	-4
Late nesting index:								
Dabblers:								
Mallard -----	1	4	--	--	--	4	5	+25
Black duck -----	1	28	9	1	2	34	41	+21
Gadwall -----	--	--	--	--	Trace	--	Trace	+
Green-winged teal -----	1	4	Trace	--	Trace	1	5	+400
Blue-winged teal -----	--	--	--	--	--	--	--	--
Shoveler -----	--	--	--	--	--	--	--	--
Pintail -----	--	--	Trace	--	Trace	1	1	--
Subtotal -----	3	36	10	1	3	40	53	+25
Divers:								
Redhead -----	--	--	--	--	--	--	--	--
Canvasback -----	Trace	--	--	--	--	--	Trace	--
Scaup -----	2	13	1	--	1	6	17	+183
Ring-necked duck -----	1	1	--	--	--	1	2	+100
Goldeneye -----	Trace	3	1	--	--	1	4	+300
Bufflehead -----	--	--	--	--	--	1	--	-100
Ruddy duck -----	Trace	--	--	--	--	--	Trace	--
Subtotal -----	4	17	2	--	1	9	24	+167
Miscellaneous:								
Scoter -----	--	1	4	1	1	6	7	+17
Merganser -----	4	31	12	1	2	49	50	+2
Subtotal -----	4	32	16	2	3	55	57	+4
Total ducks -----	11	85	28	3	7	104	134	+29
Goose brood index -----	--	--	7	5	9	57	21	-63
Average goose brood size -----	--	--	4.96	3.29	3.71	3.39	3.93	+14
Late nesting index -----	--	3	3	3	4	18	13	-28

C. WATERFOWL BANDING AND RECOVERY TABLES

TABLE C-1. --Mallard first hunting season recovery rates based on pre-hunting-season bandings, 1963

Bander and location	Number banded		First hunting season recovery rate (percent)	
	Adult	Immature	Adult	Immature
Washington:				
McNary National Wildlife Refuge -	69	238	--	9.24
Miscellaneous -----	61	92	--	--
Subtotal -----	130	330	8.46	11.82
Oregon:				
Malheur National Wildlife Refuge -	144	287	0.69	7.66
State Game Commission:				
Sauvie Island -----	186	815	10.22	25.77
Miscellaneous -----	65	61	--	--
Subtotal -----	395	1,163	7.34	22.01
California:				
Tule Lake National Wildlife Refuge -	756	390	5.95	5.38
Modoc National Wildlife Refuge -	24	192	--	14.58
Miscellaneous -----	35	63	--	--
Subtotal -----	815	645	6.01	8.37
Alberta:				
Ducks Unlimited:				
Ministik Lake -----	196	455	7.65	9.01
Miscellaneous -----	199	--	4.02	--
Subtotal -----	395	455	5.82	9.01
Idaho:				
Minidoka National Wildlife Refuge -	147	183	4.08	3.83
Camas National Wildlife Refuge -	451	89	5.32	--
Idaho Fish and Game:				
North Lake Refuge -----	245	27	4.49	--
Miscellaneous -----	2	10	--	--
Subtotal -----	845	309	4.85	2.91
Montana:				
National Bison Range -----	232	424	5.60	7.31
Fish and Game Department:				
Freezeout Lake -----	86	205	--	4.39
Bowdoin National Wildlife Refuge -	648	389	4.01	3.08
Medicine Lake National Wildlife				
Refuge -----	380	131	4.47	6.11
Miscellaneous -----	33	43	--	--
Subtotal -----	1,379	1,192	4.64	5.45

**TABLE C-1. --Mallard first hunting season recovery rates based on
pre-hunting-season bandings, 1963 (continued)**

Bander and location	Number banded		First hunting season recovery rate (percent)	
	Adult	Immature	Adult	Immature
Nevada:				
Ruby Lake National Wildlife Refuge -	310	292	6.45	4.79
Miscellaneous -----	0	14	--	--
Subtotal -----	310	306	6.45	5.56
Utah:				
Fish and Game Commission:				
Corinne area -----	75	116	--	0.00
Other locations -----	65	128	--	10.16
Subtotal -----	140	244	2.14	5.33
Saskatchewan:				
E. M. Bosak:				
Mud Lake -----	35	150	--	10.67
Murray Lake -----	133	154	3.76	3.25
Jackfish Lake -----	381	171	4.46	4.68
Blackfoot Lake -----	124	150	2.42	8.00
Miscellaneous -----	84	24	--	--
Subtotal -----	757	649	3.43	6.63
North Dakota:				
Upper Souris National Wildlife Refuge	919	717	4.79	5.02
Lower Souris National Wildlife Refuge	1,018	195	3.93	7.69
Miscellaneous -----	5	0	--	--
Subtotal -----	1,942	912	4.43	5.59
South Dakota:				
Sand Lake National Wildlife Refuge -	612	398	3.76	4.02
L. J. Reynoldson:				
Several locations -----	4	123	--	4.06
Subtotal -----	616	521	3.73	4.03
Colorado:				
Game and Fish Department:				
Jackson County -----	156	0	5.77	--
Monte Vista National Wildlife Refuge	554	931	6.14	7.73
Subtotal -----	710	931	6.06	7.73
Manitoba:				
Ducks Unlimited:				
Libau Marsh -----	25	101	--	12.87
Delta Research Station -----	96	261	--	8.43
Morton Smith:				
Saskeram River -----	145	70	2.76	--
Birch River -----	630	184	3.97	7.07
Miscellaneous -----	14	2	--	--
Subtotal -----	910	618	3.85	8.74

TABLE C-1. --Mallard first hunting season recovery rates based on pre-hunting-season bandings, 1963 (continued)

Bander and location	Number banded		First hunting season recovery rate (percent)	
	Adult	Immature	Adult	Immature
Minnesota:				
Rice Lake National Wildlife Refuge	35	166	--	8.43
Agassiz National Wildlife Refuge -	721	1,208	6.10	10.02
Tamarac National Wildlife Refuge -	161	77	3.11	--
Division of Game and Fish:				
Roseau River -----	287	1,627	7.67	12.29
Miscellaneous -----	45	17	--	--
Subtotal -----	1,249	3,095	6.33	11.02
Iowa:				
Upper Mississippi National Wildlife				
Refuge -----	6	189	--	10.58
Miscellaneous -----	75	54	--	--
Subtotal -----	81	243	--	10.60
Missouri:				
Conservation Commission:				
Clarksville area -----	74	145	--	10.34
Miscellaneous -----	17	31	--	--
Subtotal -----	91	176	--	9.66
Wisconsin:				
Horicon National Wildlife Refuge -	1,670	1,247	6.89	14.19
Upper Mississippi National Wildlife				
Refuge -----	0	521	--	9.40
Conservation Department:				
Crex Meadows -----	274	133	6.93	15.04
Miscellaneous -----	23	49	--	--
Subtotal -----	1,967	1,970	6.86	12.89
Michigan:				
Shiawassee National Wildlife Refuge	324	1,001	7.00	7.21
Conservation Department:				
Rose Lake -----	2	140	--	18.57
Miscellaneous -----	39	120	--	12.50
Subtotal -----	365	1,261	6.85	9.04
Indiana:				
Department of Conservation -----	22	124	--	4.03
Ohio:				
Division of Wildlife -----	98	255	--	9.80
Miscellaneous -----	0	3	--	--
Subtotal -----	98	258	--	9.69
Ontario:				
D. H. T. Hussell:				
Norfolk County -----	48	122	--	9.84

TABLE C-1. --Mallard first hunting season recovery rates based on pre-hunting-season bandings, 1963 (continued)

Bander and location	Number banded		First hunting season recovery rate (percent)	
	Adult	Immature	Adult	Immature
Ontario: (cont'd)				
A. T. Cringen:				
Guelph -----	14	133	--	15.79
J. H. Buckalew:				
Fort Francis -----	20	311	--	7.72
Miscellaneous -----	70	210	--	9.52
Subtotal -----	152	776	9.21	9.92
New York:				
Conservation Department:				
Howlands Island -----	181	359	6.08	10.58
Oak Orchard -----	55	610	--	7.70
Perch Lake -----	142	774	2.82	6.98
Wilson Hill -----	211	45	5.69	--
Miscellaneous -----	91	119	--	14.28
Subtotal -----	680	1,907	5.15	8.39
Vermont:				
Fish and Game Department:				
Dead Creek -----	100	244	2.00	8.61
Miscellaneous -----	24	28	--	--
Subtotal -----	124	272	4.03	8.46
Pennsylvania:				
Game Commission:				
Pymatuning Reservoir -----	597	395	3.02	3.70
Delaware:				
Bombay Hook National Wildlife Refuge -----	253	94	3.95	--

TABLE C-2. --Black duck first hunting season recovery rates based on pre-hunting-season bandings, 1963

Bander and location	Number banded		First hunting season recovery rate (percent)	
	Adult	Immature	Adult	Immature
Wisconsin:				
All locations -----	113	112	5.31	9.82
Michigan:				
All locations -----	59	144	--	9.72
Ontario:				
E. Kroll:				
Oshawa -----	61	113	--	10.62
E. H. Stone:				
Arm Lake -----	13	131	--	6.87
D. J. Gawley:				
Gogama -----	20	190	--	12.63
Miscellaneous -----	40	124	--	12.10
Subtotal -----	134	558	13.43	10.75
Quebec:				
Gaston Moisan:				
St. Methode -----	30	104	--	14.42
Nova Scotia:				
F. J. Payne:				
Argyle -----	28	179	--	11.17
Hollahans Lake -----	51	234	--	10.26
Miscellaneous -----	20	101	--	14.85
Subtotal -----	99	514	--	11.48
New York:				
Conservation Department:				
Howlands Island -----	73	149	--	14.09
Perch Lake -----	200	847	7.50	9.56
Wilson Hill -----	154	90	10.39	--
Oak Orchard -----	0	142	--	7.75
Miscellaneous -----	78	75	--	--
Subtotal -----	505	1,303	7.52	10.36
Maine:				
O. E. Seelye:				
Turner Bridge -----	33	308	--	9.42
E. J. Baker:				
Several locations -----	30	112	--	8.04
Moosehorn National Wildlife Refuge	59	293	--	3.75
Coop. Unit and State:				
Several locations -----	158	904	6.96	9.29
Subtotal -----	280	1,617	6.79	8.91
Vermont:				
Missiquoi National Wildlife Refuge	103	97	7.77	--
Fish and Game:				
Dead Creek -----	19	168	--	11.90

**TABLE C-2.--Black duck first hunting season recovery rates based on
pre-hunting-season bandings, 1963 (continued)**

Bander and location	Number banded		First hunting season recovery rate (percent)	
	Adult	Immature	Adult	Immature
Vermont: (cont'd)				
Bruce Parker:				
Lake Memphremagog -----	27	122	--	10.66
Miscellaneous -----	10	42	--	--
Subtotal -----	159	429	7.55	12.59
Massachusetts:				
Parker River National Wildlife Refuge -----	130	190	9.23	4.74

**TABLE C-3. --A comparison of mallard first hunting season recovery rates
from pre-hunting-season bandings, 1959-63¹**

Bander and location	Adult					Immature				
	1959	1960	1961	1962	1963	1959	1960	1961	1962	1963
Pacific Flyway:										
Oregon:										
Malheur National Wildlife										
Refuge -----	--	5.6	5.7	3.2	0.7	--	6.3	5.1	2.5	7.7
Game Commission:										
Sauvie Island -----	19.8	17.9	10.0	10.8	10.2	23.8	25.6	18.7	23.7	25.8
California:										
Tule Lake National Wildlife										
Refuge -----	6.7	7.7	6.6	5.1	6.0	15.9	13.9	14.7	13.6	5.4
Idaho:										
Fish and Game:										
North Lake -----	--	--	--	--	4.5	--	--	--	--	--
Minidoka National Wildlife										
Refuge -----	--	--	--	4.9	4.1	--	--	--	4.8	3.8
Camas National Wildlife										
Refuge -----	--	4.5	4.2	2.5	5.3	--	--	--		
Montana:										
Ninepipe National Wildlife										
Refuge ² -----	3.7	5.8	8.8	8.2	5.6	13.9	10.5	11.3	6.7	7.3
Nevada:										
Ruby Lake National Wildlife										
Refuge -----	--	7.7	7.4	3.8	6.4	--	--	9.0	7.0	4.8
Central Flyway:										
Montana:										
Bowdoin National Wildlife										
Refuge -----	--	--	--	1.4	4.0	--	--	--	1.3	3.1
Medicine Lake National										
Wildlife Refuge -----	6.5	4.8	3.1	0.8	4.5	--	5.4	--	3.0	6.1
North Dakota:										
Upper Souris National										
Wildlife Refuge -----	--	--	4.3	2.9	4.8	--	--	6.4	0.8	5.0
Lower Souris National										
Wildlife Refuge -----	4.7	7.1	5.1	1.8	3.9	--	8.0	8.7	2.2	7.7
South Dakota:										
Sand Lake National Wildlife										
Refuge -----	--	8.3	3.8	1.8	3.8	--	7.1	3.6	4.8	4.0
Mississippi Flyway:										
Minnesota:										
Rice Lake National Wildlife										
Refuge -----	13.0	10.7	--	5.7	--	14.5	13.6	5.0	8.3	8.4
Agassiz National Wildlife										
Refuge -----	8.6	8.3	4.2	2.7	6.1	11.5	18.5	7.3	7.2	10.0
Wisconsin:										
Horicon National Wildlife										
Refuge -----	--	--	4.1	5.9	6.9	--	--	10.0	10.5	14.2
Michigan:										
Shiawassee National Wildlife										
Refuge -----	--	--	8.2	4.1	7.0	12.1	15.3	8.3	6.3	7.2

TABLE C-3.--A comparison of mallard first hunting season recovery rates from pre-hunting-season bandings, 1959-63¹ (continued)

Bander and location	Adult					Immature				
	1959	1960	1961	1962	1963	1959	1960	1961	1962	1963
Mississippi Flyway: (cont'd)										
Ohio:										
Division of Wildlife:										
Several locations -----	--	--	--	4.5	--	--	--	--	4.7	9.8
Atlantic Flyway:										
New York:										
Conservation Department:										
Howlands Island -----	--	--	--	--	6.1	--	8.3	11.5	6.3	10.6
Oak Orchard -----	--	--	--	--	--	--	--	--	14.5	7.7
Perch Lake -----	--	--	--	--	2.8	11.1	13.8	12.7	7.8	7.0
Wilson Hill -----	--	--	--	7.0	5.7	--	--	--	16.2	--
Canada										
Alberta:										
All locations -----	--	5.9	--	7.7	5.8	--	--	8.0	7.5	9.0
Saskatchewan:										
All locations -----	--	4.4	--	5.0	3.4	--	--	6.1	6.1	6.6
Manitoba:										
All locations -----	--	6.4	--	5.9	3.8	--	--	7.8	8.6	8.7
Ontario:										
Guelph -----	--	--	--	--	--	--	--	14.6	17.3	15.8

¹No rates from bandings less than 100 birds were included.

²Nineteen sixty-three bandings by National Bison Range permit.

TABLE C-4.--A comparison of mallard relative recovery rates from pre-hunting-season bandings of adult and immature birds, 1959-63¹

Bander and location	1959	1960	1961	1962	1963
Pacific Flyway:					
Oregon:					
Malheur National Wildlife Refuge -----	--	--	0.9	0.8	11.1
Sauvie Island -----	1.2	1.4	1.9	2.2	2.5
California:					
Tule Lake National Wildlife Refuge -----	2.4	1.8	2.2	2.7	0.9
Idaho:					
Minidoka National Wildlife Refuge -----	--	--	--	1.0	0.9
Montana ² :					
Ninepipe National Wildlife Refuge -----	--	--	1.3	0.8	1.3
Nevada:					
Ruby Lake National Wildlife Refuge -----	--	--	1.2	1.9	0.7
Central Flyway:					
Montana:					
Bowdoin National Wildlife Refuge -----	1.2	0.6	--	1.0	0.8
Medicine Lake National Wildlife Refuge -----	--	1.1	--	3.6	1.4
North Dakota:					
Upper Souris National Wildlife Refuge -----	--	--	--	--	1.0
Lower Souris National Wildlife Refuge -----	--	1.4	1.7	1.2	2.0
South Dakota:					
Sand Lake National Wildlife Refuge -----	--	0.8	0.9	2.7	1.1
Colorado:					
Monte Vista National Wildlife Refuge -----	--	--	--	--	1.2
Mississippi Flyway:					
Minnesota:					
Agassiz National Wildlife Refuge -----	1.3	2.2	1.7	2.7	1.6
Roseau River -----	--	--	--	--	1.6
Wisconsin:					
Horicon National Wildlife Refuge -----	--	--	2.4	1.9	2.0
Crex Meadows -----	--	--	--	--	2.2
Michigan:					
Shiawassee National Wildlife Refuge -----	--	--	1.0	1.5	1.0
Atlantic Flyway:					
New York:					
Howlands Island -----	--	1.4	2.0	1.4	1.7
Perch Lake -----	1.9	1.6	1.1	1.3	2.5
Canada:					
Alberta:					
Ministrik Lake -----	--	--	--	1.2	1.2
Saskatchewan Provincial total -----	--	--	--	1.2	1.9
Manitoba Provincial total -----	--	--	--	1.4	2.3

¹Relative recovery rate = $\frac{\text{immature recovery rate}}{\text{adult recovery rate}}$.

²Nineteen sixty three bandings on National Bison Range permit.

TABLE C-5. --Regional differences in recovery rates of mallards from 1963 pre-hunting-season bandings in Central and Mississippi Flyways

Banding location	Number banded		Area of recovery	Recovery rate		Relative recovery rate
	Adult	Immature		Adult	Immature	
Upper and Lower Souris National Wildlife Refuges --	1,937	802	Canada, North Dakota, South Dakota, Minnesota.	1.86	2.74	1.47
			Wyoming, Nebraska, Kansas, Iowa, Missouri, Illinois, Indiana, Wisconsin, Michigan, Maryland, Kentucky.	1.08	1.12	1.04
			New Mexico, Texas, Arkansas, Louisiana, Mississippi, South Carolina.	1.39	2.49	1.79
Agassiz National Wildlife Refuge -----	721	1,208	Minnesota, North Dakota, Prairie Provinces	2.36	6.87	2.91
			South Dakota, Wisconsin, Michigan, Iowa, Kentucky, Missouri, Illinois, Ontario	2.22	2.65	1.19
			Alabama, Arkansas, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Texas	1.52	0.50	0.33
Horicon National Wildlife Refuge -----	1,670	1,247	Wisconsin	4.67	11.71	2.51
			Rest of Mississippi Flyway	2.04	2.24	1.10
			Atlantic Flyway	0.18	0.24	1.33
Shiawassee National Wildlife Refuge -----	324	1,001	Michigan, Wisconsin, Ontario, Minnesota	4.01	4.20	1.05
			Illinois, Pennsylvania, Iowa, Indiana, New Jersey, Ohio, Virginia	0.92	1.40	1.52
			Florida, South Carolina, Tennessee	2.16	1.70	0.79

**TABLE C-6. --Recovery rates of male and female mallards from 1963
pre-hunting-season bandings**

[Recoveries in Canada excluded]

State and location	Adult			Immature		
	Recovery rate (percent)		Males per Female	Recovery rate (percent)		Males per Female
	Male	Female		Male	Female	
Pacific Flyway:						
Washington:						
McNary National Wildlife Refuge -----	--	--	--	10.66	7.66	1.4
Oregon:						
Malheur National Wildlife Refuge -----	--	--	--	9.64	4.96	1.9
Sauvie Island -----	--	--	--	28.25	23.37	1.2
California:						
Tule Lake National Wildlife Refuge ----	--	--	--	6.06	4.40	1.4
Idaho:						
Camas National Wildlife Refuge -----	6.48	3.92	1.6	--	--	--
Montana:						
National Bison Range -----	--	--	--	7.87	6.37	1.2
Nevada:						
Ruby Lake National Wildlife Refuge ----	5.88	6.81	0.9	6.33	2.99	2.1
Central Flyway:						
Montana:						
Bowdoin National Wildlife Refuge -----	4.52	0.72	6.3	3.61	0.71	5.1
Medicine Lake National Wildlife Refuge -	6.31	2.20	2.9	--	--	--
North Dakota:						
Upper Souris National Wildlife Refuge --	6.22	3.20	1.9	6.62	3.25	2.0
Lower Souris National Wildlife Refuge --	4.30	1.46	2.9	--	--	--
South Dakota:						
Sand Lake National Wildlife Refuge ----	5.91	2.82	2.1	6.81	1.45	4.7
Colorado:						
Monte Vista National Wildlife Refuge ---	3.90	7.74	0.5	7.87	7.48	1.0
Mississippi Flyway:						
Minnesota:						
Agassiz National Wildlife Refuge -----	5.42	6.06	0.9	8.79	11.09	0.8
Roseau River -----	6.56	8.48	0.8	12.56	9.00	1.4
Wisconsin:						
Horicon National Wildlife Refuge -----	7.88	6.30	1.2	15.27	13.24	1.2
Michigan:						
Shiawassee National Wildlife Refuge ---	--	--	--	6.63	5.39	1.2
Atlantic Flyway:						
New York:						
Howlands Island -----	--	--	--	10.59	10.05	1.0
Oak Orchard -----	--	--	--	8.21	5.34	1.5
Perch Lake -----	--	--	--	6.23	4.80	1.3

TABLE C-6.--Recovery rates of male and female mallards from 1963
pre-hunting-season bandings (continued)

[Recoveries in Canada excluded]

State and location	Adult			Immature		
	Recovery rate (percent)		Males per Female	Recovery rate (percent)		Males per Female
	Male	Female		Male	Female	
Atlantic Flyway: (cont'd)						
Vermont:						
Dead Creek -----	--	--	--	9.01	5.26	1.7
Pennsylvania:						
Pymatuning Reservoir -----	5.05	2.01	2.5	2.58	4.58	0.6

TABLE C-7.--Comparison of black duck first hunting season recovery rates, 1959 to 1963

Location of banding	Adult					Immature				
	1959	1960	1961	1962	1963	1959	1960	1961	1962	1963
Ontario:										
Oshawa -----	--	--	--	--	--	--	--	13.6	13.0	10.6
New York:										
Perch Lake -----	6.6	11.5	--	7.8	7.5	9.9	13.6	14.0	8.3	9.6
Oak Orchard -----	--	--	--	--	--	--	--	7.3	10.9	7.6
Wilson Hill -----	8.1	15.3	7.5	8.4	10.4	11.8	18.1	9.0	12.7	--
Maine:										
Coop. Unit & State:										
(Several locations) -----	--	--	--	8.8	7.0	--	--	--	10.6	9.3
E. J. Baker:										
(Richmond) -----	--	--	--	--	--	--	--	--	10.8	8.0
Moosehorn National Wildlife										
Refuge -----	--	--	--	--	--	--	--	5.5	6.9	3.4
Vermont:										
Mississquoi National Wildlife										
Refuge -----	--	--	--	14.0	7.8	--	--	--	8.7	--
Massachusetts:										
Parker River National Wildlife										
Refuge -----	--	--	--	--	9.2	--	--	8.9	9.9	4.7

TABLE C-8. --Black duck relative recovery rates from pre-hunting-season bandings of adult and immature birds, 1959 to 1963

$$\left[\text{Relative recovery rate} = \frac{\text{immature recovery rate}}{\text{adult recovery rate}} \right]$$

Location of banding	1959	1960	1961	1962	1963
Wisconsin:					
All locations -----	--	--	--	--	1.8
Ontario:					
All locations -----	--	--	--	--	0.8
New York:					
Perch Lake -----	1.5	1.8	2.3	1.1	1.3
All locations -----	--	--	--	--	1.4
Maine:					
Coop. Unit & State -----	--	--	--	1.2	1.3
All locations -----	--	--	--	--	1.3
Vermont:					
All locations -----	--	--	--	--	1.7
Massachusetts:					
Parker River National Wildlife Refuge -----	--	--	--	--	0.5

TABLE C-9. --Regional differences in the recovery rates of black ducks from 1963 pre-hunting-season bandings in Maine and New York

Banding location	Adult	Immature	Area of recovery	Recovery rate (percent)		Relative recovery rate
				Adult	Immature	
Maine -----	280	1,617	Maine, New Hampshire, Vermont, New York, and Canada	4.28	6.00	1.40
			South	2.50	2.91	1.16
New York -----	505	1,303	New York, and North	3.96	7.75	1.96
			South of New York	3.56	2.61	0.73

TABLE C-10. --Pre-hunting-season bandings and first hunting season recovery rates of blue-winged teal, 1963

Banding location	Number banded		Number of recoveries		First hunting season recovery rate (percent)	
	Adults	Immatures	Adults	Immatures	Adults	Immatures
Canada:						
Alberta:						
Vermilion-Camrose ----	757	241	6	3	0.79	1.24
Saskatchewan:						
Yorkton-Regina -----	353	706	3	18	0.85	2.55
Prince Albert-N. Battleford -----	1,337	134	9	1	0.67	0.75
Swift Current -----	389		3	--	0.77	--
Manitoba:						
Winnipeg-Brandon ----	293	2,050	3	60	1.02	2.93
Central Flyway:						
Montana -----	174	281	0	1	--	0.36
North Dakota -----	1,509	--	4	--	0.26	--
South Dakota -----	608	2,851	3	16	0.49	0.56
Nebraska -----	285	--	2	--	0.70	--
Mississippi Flyway:						
Minnesota -----	789	1,744	7	91	0.89	5.22
Michigan -----	--	118	--	2	--	1.69
Iowa -----	813	2,352	13	127	1.60	5.40
Missouri -----	--	406	--	2	--	0.49
Illinois -----	--	266	--	3	--	1.13
Ohio -----	124	317	1	2	0.81	0.63

TABLE C-11. --Comparison of first hunting season recovery rates of blue-winged teal, 1961 to 1963

Banding location	Adults			Immatures		
	1961	1962	1963	1961	1962	1963
Canada:						
Alberta:						
Vermilion-Camrose -----	0.44	1.16	0.79	--	0.44	1.24
Saskatchewan:						
Yorkton-Regina -----	0.97	0.51	0.85	1.32	1.68	2.55
Prince Albert-N. Battleford -----	0.73	0.28	0.67	--	3.45	0.75
Manitoba:						
Winnipeg-Brandon -----	--	0.30	1.02	--	3.38	2.93
Central Flyway:						
Montana -----	--	--	--	--	1.16	0.36
North Dakota -----	--	1.00	0.26	--	--	--
Mississippi Flyway:						
Michigan -----	--	--	--	4.18	4.95	1.69
Iowa -----	0.29	1.18	1.60	--	1.86	5.40

D. WATERFOWL HARVEST TABLES

TABLE D-1. --Percentage comparison between reported and observed hourly kill
1961-62, 1962-63, and 1963-64 combined

Time of day	Birds bagged		Percentage bagged	
	Reported	Observed	Reported	Observed
5-6 a.m. -----	6	9	0.7	1.0
6-7 a.m. -----	50	59	5.6	6.6
7-8 a.m. -----	218	243	24.5	27.3
8-9 a.m. -----	221	169	24.9	19.0
9-10 a.m. -----	93	102	10.5	11.5
10-11 a.m. -----	49	43	5.5	4.8
11-12 a.m. -----	27	43	3.0	4.8
12-1 p.m. -----	38	34	4.3	3.8
1-2 p.m. -----	30	29	3.4	3.3
2-3 p.m. -----	58	44	6.5	4.9
3-4 p.m. -----	49	60	5.5	6.7
4-5 p.m. -----	38	44	4.3	4.9
5-6 p.m. -----	12	10	1.3	1.1
Total -----	889	889	100.0	99.7

TABLE D-2. --Difference between reported and observed times of kill combining
1961-62, 1962-63, and 1963-64 data

Range in minutes	Relationship of reported to observed ducks-bagged			Percent of total reports	Accumulated percent	Difference between observed and reported time in minutes			
	Later	Earlier	Total			Total		Net	Average
						Later	Earlier		
0-30-----	214	248	597 ¹	67.2	67.2	2675	2824	-149	-0.2
0-15-----	133	166	434 ¹	48.8	--	982	937	+45	+0.1
16-30-----	81	82	163	18.3	--	1693	1887	-194	-1.2
31-60-----	83	68	151	17.0	84.2	3770	3018	+752	+5.0
61-90-----	46	22	68	7.6	91.8	3407	1655	+1752	+25.8
91-120-----	22	11	33	3.7	95.5	2297	1155	+1142	+34.6
121-150-----	11	6	17	1.9	97.4	1483	836	+647	+38.0
151-180-----	3	7	10	1.1	98.5	527	1166	-639	-63.9
181-210-----	4	3	7	0.8	99.3	778	559	+219	+31.3
211-240-----	2	1	3	0.3	99.6	453	240	+213	+71.0
241-270-----	--	1	1	0.1	99.7	--	266	-266	-266.0
271-300-----	--	--	--	--	--	--	--	--	--
301-330-----	--	--	--	--	--	--	--	--	--
331-360-----	2	--	2	0.2	99.9	693	--	+693	+346.5
Total-----	387	367	889	99.9	--	16,083	11,719	+4364	+4.9

¹ 135 reported at exact time observed killed.

TABLE D-3. —Proportion of their observed kill hunters reported by means of wing envelopes 1961-62, 1962-63, and 1963-64 combined

Birds bagged per hunter	Observed number of		Birds bagged	Blinds reporting		Proportion of their kill reported by hunters	
	Hunters/blind	Blinds		Number	Percent	Number	Percent
0.1-1.0	1	31	31	22	70	19	61
	2	106	155	65	61	84	54
	3	32	72	17	53	32	44
	4	7	20	5	71	13	65
	5	4	19	2	50	13	68
	6	4	10	3	75	7	70
Subtotal-----		184	307	114	62	168	55
1.1-2.0	1	33	64	23	70	38	59
	2	77	268	58	75	154	58
	3	19	97	14	74	60	62
	4	10	67	7	70	42	63
	5	5	40	4	80	23	58
	6	3	26	3	100	10	39
Subtotal-----		147	562	109	74	327	58
2.1-6.0	1	36	137	28	78	87	64
	2	53	375	40	75	234	62
	3	12	103	11	92	66	64
	4	6	65	6	100	30	46
	5	1	14	1	100	11	79
	6	--	--	--	--	--	--
Subtotal-----		108	694	86	80	428	62
Total ----		439	1563	309	70	923	59

TABLE D-4. —Summary of shots fired, ducks bagged and crippling, loss by regions, and Flyways 1961-62, 1962-63, and 1963-64, data combined

	Number of ducks					Number per 100 shots				Shots per		Cripples per bird bagged
	Shots fired	Knocked down	Sailers	Hits	Bagged	Knocked down	Sailers	Hits	Bagged	bird		
										Hits	Bagged	
Regions:												
1-----	2,050	438	192	630	416	21.4	9.4	30.7	20.3	3.25	4.93	0.51
2-----	1,668	286	77	363	240	17.1	4.6	21.8	14.4	4.60	6.95	0.51
3-----	2,344	394	121	515	344	16.8	5.2	22.0	14.7	4.55	6.81	0.50
4-----	2,388	502	151	653	455	21.0	6.3	27.3	19.1	3.66	5.25	0.44
5-----	1,822	364	69	433	315	20.0	3.8	23.8	17.3	4.21	5.78	0.37
Flyways:												
Pacific--	2,403	522	195	717	473	21.7	8.1	29.8	19.7	3.35	5.08	0.52
Central--	1,764	286	99	385	253	16.2	5.6	21.8	14.3	4.58	6.97	0.52
Miss. ---	3,129	553	174	728	490	17.7	5.6	23.3	15.7	4.30	6.39	0.49
Atlantic--	2,976	623	142	765	554	20.9	4.8	25.7	18.6	3.89	5.37	0.38
Total----	10,272	1,984	610	2,595	1,770	19.3	5.9	25.3	17.2	3.96	5.80	0.47

NOTE: Because of the limited nature and design of the sample, this material should not necessarily be considered as representative of either Regions or Flyways.

TABLE D-5.--Percentage of cripples that hunters reported, grouped by frequency class of cripples per blind-day, 1962-63 and 1963-64 data

Cripples per blind-day	Number of blind-days		Number of cripples		Percentage of cripples reported
	Reported	Observed	Reported	Observed	
0 -----	99	53	--	--	--
1 -----	86	73	86	73	118
2 -----	40	49	80	98	82
3 -----	13	34	39	102	38
4 -----	10	18	40	72	56
5 -----	3	9	15	45	33
6 -----	1	11	6	66	9
7 -----	--	3	--	21	0
8 -----	2	3	16	24	67
9 -----	--	--	--	--	--
10 -----	--	1	--	10	--
Total -----	254	254	282	511	55

TABLE D-6. -- Ratios of shots fired to birds bagged and cripples lost, to birds bagged in relation to sunrise and sunset, 1961-62, 1962-63, and 1963-64 data combined

Flyways	Before sunrise	Hours after sunrise					Mid period ¹	Hours before sunset				After sunset	Entire day	Total shots
		0-1	1-2	2-3	3-4	4-5		4-3	3-2	2-1	1-0			
Pacific:														
birds bagged -----	70	108	60	39	22	12	23	24	36	40	39	--	473	2,403
shots/birds bagged -----	3.27	5.02	5.27	5.08	5.55	10.25	7.87	6.75	5.56	4.40	3.69	--	5.08	
cripples/birds bagged ---	0.46	0.56	0.48	0.77	0.45	0.67	0.65	0.54	0.31	0.20	0.59	--	0.52	
Central:														
birds bagged -----	15	112	50	22	18	2	2	1	8	7	16	--	253	1,764
shots/birds bagged -----	5.07	5.76	7.80	8.64	7.44	17.50	12.00	14.00	4.75	11.86	8.19	--	6.97	
cripples/birds bagged ---	0.33	0.46	0.42	0.68	0.28	1.00	3.00	3.00	0.63	1.57	0.44	--	0.52	
Mississippi:														
birds bagged -----	12	144	98	67	35	22	37	10	25	16	24	--	490	3,129
shots/birds bagged -----	1.92	5.97	6.17	6.70	6.77	7.41	6.70	8.70	6.40	7.50	7.13	--	6.39	
cripples/birds bagged ---	0.17	0.50	0.49	0.55	0.40	0.32	0.43	0.70	0.52	0.44	0.63	--	0.49	
Atlantic:														
birds bagged -----	2	150	93	36	28	22	44	26	32	59	47	15	554	2,976
shots/birds bagged -----	7.50	4.72	4.84	6.31	5.11	4.68	6.70	8.92	5.41	5.08	5.55	4.60	5.37	
cripples/birds bagged ---	--	0.31	0.35	0.25	0.29	0.45	0.73	0.81	0.28	0.27	0.49	0.20	0.38	
All flyways:														
birds bagged -----	99	514	301	164	103	58	106	61	101	122	126	15	1,770	10,272
shots/birds bagged -----	3.46	5.36	5.85	6.49	6.17	7.31	7.06	8.11	5.65	5.57	5.61	6.00	5.80	
cripples/birds bagged ---	0.39	0.45	0.44	0.55	0.36	0.47	0.65	0.72	0.38	0.34	0.54	0.53	0.47	

NOTE: Because of the limited nature and design of the sample, this material should not necessarily be considered as representative of Flyways.

¹ Because time of day was computed as the number of hours after sunrise or before sunset and the data were taken from days of unequal length, a mid period of variable length remained.

TABLE D-7. --- Total potential and active hunters during 1962-63 and 1963-64 waterfowl hunting seasons

State	1962-63		1963-64	
	Potential hunters	Active hunters	Potential hunters	Active hunters
Pacific Flyway:				
Arizona -----	6,546	4,807	7,887	5,199
California -----	135,581	106,854	147,334	120,609
Idaho -----	24,337	19,443	25,625	20,743
Nevada -----	8,678	5,970	9,486	7,483
Oregon -----	42,467	33,077	47,421	36,150
Utah -----	23,787	20,607	27,075	24,351
Washington -----	67,361	48,783	71,503	53,480
Flyway total -----	308,757	239,541	336,331	268,015
Central Flyway:				
Colorado -----	17,201	13,010	25,106	19,140
Kansas -----	24,330	16,123	31,387	22,436
Montana -----	16,145	11,118	21,984	15,780
Nebraska -----	21,118	14,193	28,818	22,727
New Mexico -----	2,164	1,674	5,992	5,149
North Dakota -----	28,307	22,853	39,824	32,243
Oklahoma -----	16,418	11,105	21,928	16,230
South Dakota -----	31,145	24,198	39,697	31,171
Texas -----	57,062	43,682	80,666	59,090
Wyoming -----	4,058	3,040	5,344	3,781
Flyway total -----	217,948	160,996	300,746	227,747
Mississippi Flyway:				
Alabama -----	6,861	5,490	12,274	9,882
Arkansas -----	10,356	8,622	19,742	15,580
Illinois -----	45,882	37,226	56,314	43,324
Indiana -----	17,396	12,861	18,105	13,029
Iowa -----	33,152	26,075	39,750	32,088
Kentucky -----	4,903	4,025	6,163	4,960
Louisiana -----	43,396	31,057	71,971	57,382
Michigan -----	54,061	41,958	75,232	58,185
Minnesota -----	85,076	72,135	120,150	106,065
Mississippi -----	7,744	6,413	14,380	11,394
Missouri -----	29,445	23,087	36,752	29,485
Ohio -----	21,855	17,904	25,342	20,731
Tennessee -----	8,723	7,270	16,430	13,388
Wisconsin -----	79,694	63,516	101,222	82,119
Flyway total -----	448,544	357,639	613,827	497,612
Atlantic Flyway:				
Connecticut -----	7,597	5,678	8,097	5,676
Delaware -----	5,992	4,750	7,740	5,970
Florida -----	21,984	15,911	27,591	20,392
Georgia -----	6,280	4,655	11,302	8,582
Maine -----	8,505	6,806	10,501	8,071
Maryland -----	20,158	15,743	23,976	18,461
Massachusetts -----	18,288	12,938	22,850	15,631
New Hampshire -----	4,610	3,400	3,811	2,726
New Jersey -----	19,979	15,872	23,337	18,124
New York -----	53,214	36,328	46,606	28,370
North Carolina -----	21,775	17,378	25,258	19,042
Pennsylvania -----	29,428	24,547	35,794	28,403

TABLE D-7. --Total potential and active hunters during 1962-63 and
1963-64 waterfowl hunting seasons (continued)

State	1962-63		1963-64	
	Potential hunters	Active hunters	Potential hunters	Active hunters
Atlantic Flyway: (cont'd)				
Rhode Island -----	1,730	1,453	2,468	1,920
South Carolina -----	11,151	9,334	14,132	11,557
Vermont -----	3,883	3,107	3,714	2,728
Virginia -----	14,960	10,832	19,005	14,458
West Virginia -----	1,528	1,208	1,517	989
Flyway total -----	251,422	189,940	287,699	211,100

TABLE D-8. --Total bags of ducks, by species, and coots and total non-retrieved ducks and coots in Pacific Flyway during 1962 and 1963 hunting seasons

[Bag estimates adjusted for response bias]

Species ¹	1962	1963	Percent change
Ducks:			
Dabblers:			
Mallard	572,300	843,900	+47
Domestic mallard	1,200	300	-75
Gadwall	43,600	99,900	+129
American widgeon	256,000	324,400	+27
Green-winged teal	250,800	376,300	+50
Blue-winged and cinnamon teal	59,200	95,000	+60
Shoveler	123,200	256,900	+109
Pintail	418,900	585,800	+40
Wood duck	11,300	16,100	+42
Divers:			
Redhead	4,000	8,300	+108
Canvasback	500	500	0
Greater scaup	36,700	10,700	-71
Lesser scaup	21,200	28,200	+33
Ring-necked duck	8,700	15,500	+78
Goldeneye	14,800	16,900	+14
Bufflehead	24,800	27,300	+10
Ruddy duck	23,800	35,200	+48
Miscellaneous:			
Common and red-breasted merganser	2,800	1,200	-57
Hooded merganser	1,500	1,000	-33
Oldsquaw	1,300	0	-
Scoter	7,300	800	-89
Others and unknown	1,400	0	-
Total:			
Retrieved	1,884,600	2,741,500	+45
Not retrieved	404,700	545,500	+35
Ducks killed	2,289,300	3,286,900	+44
Coots:			
Retrieved	67,300	72,000	+7
Not retrieved	30,000	52,300	+74
Coots killed	97,300	124,300	+28

¹Species composition derived from the 1962 and 1963 duck wing surveys.

TABLE D-9. --Total bags, by species, and crippling losses of geese in the Pacific Flyway during the 1962 and 1963 hunting seasons

[Bag estimates adjusted for response bias]

Species	1962	1963	Percent change
Geese:			
Canada goose	116,300	182,500	+57
Snow goose	34,800	66,700	+92
Blue goose	200	0	--
White-fronted goose	52,400	68,600	+31
Black brant	10,000	11,100	+11
Total:			
Retrieved	213,700	328,900	+54
Not retrieved	37,500	64,500	+72
Geese killed	251,200	393,400	+57

TABLE D-10.--Waterfowl hunting activity and bags of ducks and geese in the PACIFIC FLYWAY during the 1963 hunting season, with 1962 season comparisons

[Estimates unadjusted for response bias. Colorado, Montana, New Mexico, and Wyoming listed in Central Flyway, table D-13]

Hunting season	Duck bag limit	Days in duck season	Days per active hunters	Hunter-days		Duck bag		Goose bag	
				Days per adult hunter	State total	Seasonal bag per adult hunter	State total	Seasonal bag per adult hunter	State total
Arizona:									
1962 -----	5-5	68 ¹	4,810	5.15	24,800	4.67	21,700	0.41	1,900
1963 -----	5-5	90	5,200	6.47	33,700	7.10	35,800	0.32	1,600
Percent change -			+8	+26	+36	+52	+65	-22	-16
California:									
1962 -----	5-5	68 ¹	106,850	7.34	786,700	11.90	1,231,700	1.65	169,600
1963 -----	6-6	75	120,610	7.39	894,200	16.08	1,879,100	2.30	267,800
Percent change -			+13	+1	+14	+35	+53	+39	+58
Idaho:									
1962 -----	5-5	75	19,440	6.78	132,300	10.29	193,900	0.55	10,200
1963 -----	5-5	93	20,740	7.98	166,100	15.27	306,900	1.08	21,500
Percent change -			+7	+18	+26	+48	+58	+96	+111
Nevada:									
1962 -----	4-8	65	5,970	6.12	36,700	6.77	39,200	0.67	3,900
1963 -----	4-8	87	7,480	7.02	52,700	10.57	76,600	0.84	6,100
Percent change -			+25	+15	+44	+56	+95	+25	+56
Oregon:									
1962 -----	4-8	75	33,080	7.58	251,400	8.80	282,000	0.92	29,500
1963 -----	4-8	90	36,150	7.01	254,200	8.70	304,700	1.42	49,600
Percent change -			+9	-8	-1	-1	+8	+54	+68
Utah:									
1962 -----	5-5	75	20,610	5.10	105,500	7.25	144,700	0.34	6,800
1963 -----	5-5	90	24,350	6.71	163,900	12.88	303,900	0.43	10,200
Percent change -			+18	+32	+55	+78	+110	+27	+50

¹Split season.

TABLE D-10. --Waterfowl hunting activity and bags of ducks and geese in the PACIFIC FLYWAY during the 1963 hunting season, with 1962 season comparisons (continued)

[Estimates unadjusted for response bias. Colorado, Montana, New Mexico, and Wyoming listed in Central Flyway, table D-13]

Hunting season	Duck bag limit	Days in duck season	Days per active hunters	Hunter-days		Duck bag		Goose bag	
				Days per adult hunter	State total	Seasonal bag per adult hunter	State total	Seasonal bag per adult hunter	State total
Washington:									
1962 -----	4-8	75	48,780	7.96	389,300	10.02	473,800	0.62	29,100
1963 -----	4-8	86	53,480	7.97	427,600	10.91	565,300	0.57	29,400
Percent change -			+10	0	+10	+9	+19	-8	+1
Flyway total:									
1962 -----	---	--	239,540	7.19	1,726,700	10.28	2,387,000	1.09	251,000
1963 -----	---	--	268,020	7.41	1,992,500	13.32	3,472,300	1.48	386,200
Percent change -	---	--	+12	+3	+15	+30	+46	+36	+54

TABLE D-11. --Total bags of ducks, by species, and coots and total non-retrieved ducks and coots in the CENTRAL FLYWAY during the 1962 and the 1963 hunting seasons

[Bag estimates adjusted for response bias]

Species ¹	1962	1963	Percent change
Ducks:			
Dabblers:			
Mallard	220,700	457,400	+107
Domestic mallard	200	100	-50
Black duck	600	900	+50
Black X Mallard	0	400	-
Mottled duck	10,600	18,400	+74
Gadwall	39,400	116,300	+195
American widgeon	30,300	80,900	+167
Green-winged teal	49,000	125,200	+156
Blue-winged and cinnamon teal	9,500	43,800	+361
Shoveler	17,300	43,900	+154
Pintail	50,400	102,900	+104
Wood duck	9,400	18,500	+97
Divers:			
Redhead	1,200	4,000	+233
Canvasback	0	300	-
Greater scaup	700	800	+14
Lesser scaup	12,200	37,600	+208
Ring-necked duck	11,500	15,000	+30
Goldeneye	1,000	3,400	+240
Bufflehead	2,200	4,200	+91
Ruddy duck	1,400	2,100	+50
Miscellaneous:			
Common and red-breasted merganser	300	500	+67
Hooded merganser	500	1,700	+240
Scoter	0	0	0
Others and unknown	200	100	-50
Total:			
Retrieved	468,300	1,078,600	+130
Not retrieved	129,400	264,800	+105
Ducks killed	597,700	1,343,500	+125
Coots:			
Retrieved	10,100	22,700	+125
Not retrieved	7,900	10,300	+30
Coots killed	18,000	33,000	+83

¹Species composition derived from the 1962 and 1963 duck wing surveys.

TABLE D-12. --Total bags, by species, and crippling losses of geese in the
CENTRAL FLYWAY during the 1962 and 1963 hunting seasons

[Bag estimates adjusted for response bias]

Species	1962	1963	Percent change
Geese:			
Canada goose ¹	82,800	114,000	+38
Snow goose	61,600	87,000	+41
Blue goose	25,400	33,600	+32
White-fronted goose	23,100	29,900	+29
Brant	0	200	--
Total:			
Retrieved	192,900	264,800	+37
Not retrieved	30,400	46,700	+54
Geese killed	223,300	311,500	+39

¹Includes Hutchins' goose.

TABLE D-13. --Waterfowl hunting activity and bags of ducks and geese in CENTRAL FLYWAY during 1963 hunting season, with 1962 season comparisons

[Estimates unadjusted for response bias]

Hunting season	Duck bag limit	Days in duck season	Total active hunters	Hunter-days		Duck bag		Goose bag	
				Days per adult hunter	State total	Seasonal bag per adult hunter	State total	Seasonal bag per adult hunter	State total
Colorado									
1962 -----	2-4	25	13,010	5.76	74,200	2.76	34,700	0.58	7,200
	4-8	75 ¹							
1963 -----	4-8	35	19,140	5.93	112,400	5.41	100,200	0.63	11,400
	4-8	90 ¹							
Percent change -			+47	+3	+52	+96	+189	+9	+58
Kansas									
1962 -----	2-4	25	16,120	6.17	98,400	2.71	42,200	0.45	6,800
1963 -----	4-8	35	22,440	6.80	151,000	5.41	117,400	0.46	9,900
Percent change -			+39	+10	+54	+100	+178	+2	+46
Montana									
1962 -----	2-4	25	11,120	6.07	66,800	3.89	41,900	0.83	8,800
	5-5	75 ¹							
1963 -----	4-8	35	15,780	6.04	94,400	6.87	104,900	0.50	7,500
	5-10	75 ¹							
Percent change -			+42	-1	+41	+77	+150	-40	-15
Nebraska									
1962 -----	2-4	25	14,190	7.91	111,200	3.25	44,600	0.91	12,200
1963 -----	4-8	32 ²	22,730	6.47	145,600	6.53	143,500	0.71	15,300
Percent change			+60	-18	+31	+101	+222	-22	+25
New Mexico									
1962 -----	2-4	25 ¹	1,670	4.94	8,200	3.45	5,600	0.34	500
	4-8	75 ¹							
1963 -----	4-8	35	5,150	6.40	32,600	7.49	37,300	0.58	2,800
	4-8	86 ¹							
Percent change -			+208	+30	+298	+117	+566	+71	+460
North Dakota									
1962 -----	2-4	25	22,850	6.37	144,200	5.55	122,700	0.96	20,800
1963 -----	4-8	35	32,240	7.45	237,800	7.27	226,700	1.74	53,400
Percent change -			+41	+17	+65	+31	+85	+81	+157

TABLE D-13. --Waterfowl hunting activity and bags of ducks and geese in CENTRAL FLYWAY during 1963 hunting season, with 1962 season comparisons (continued)

[Estimates unadjusted for response bias]

Hunting season	Duck bag limit	Days in duck season	Total active hunters	Hunter-days		Duck bag		Goose bag	
				Days per adult hunter	State total	Seasonal bag per adult hunter	State total	Seasonal bag per adult hunter	State total
Oklahoma									
1962 -----	2-4	25	11,110	6.06	66,600	2.84	30,500	0.75	7,900
1963 -----	4-8	35	16,230	5.74	92,200	3.18	49,900	0.97	14,900
Percent change -			+46	-5	+38	+12	+64	+29	+89
South Dakota									
1962 -----	2-4	25	24,200	6.82	163,500	4.57	106,900	2.05	47,200
1963 -----	4-8	35	31,170	7.71	237,900	9.50	286,400	1.62	48,000
Percent change -			+29	+13	+46	+108	+168	-21	+2
Texas									
1962 -----	2-4	25	43,680	6.49	280,500	4.47	188,700	2.64	109,500
1963 -----	4-8	35	59,090	5.92	346,300	6.42	366,900	2.49	139,700
Percent change -			+35	-9	+24	+44	+94	-6	+28
Wyoming									
1962 -----	2-4	25	3,040	5.87	17,700	5.41	15,900	0.47	1,300
	4-8	75 ¹							
1963 -----	4-8	35	3,780	5.70	21,300	7.20	26,300	0.57	2,000
	4-8	88 ¹							
Percent change -			+24	-3	+20	+33	+65	+21	+54
Flyway total:									
1962 -----	---	--	161,000	6.47	1,031,200	4.07	633,600	1.45	222,200
1963 -----	---	--	227,750	6.53	1,471,600	6.63	1,459,600	1.40	304,900
Percent change -	---	--	+42	+1	+43	+63	+130	-3	+37

¹ State's bag limit and season length west of Continental Divide (Pacific Flyway).

² Split season.

TABLE D-14. --Total bags of ducks, by species, and coots and total non-retrieved ducks and coots in the MISSISSIPPI FLYWAY during the 1962 and the 1963 hunting seasons

[Bag estimates adjusted for response bias]

Species ¹	1962	1963	Percent change
Ducks:			
Dabblers:			
Mallard	442,200	925,500	+109
Domestic Mallard	1,700	4,400	+159
Black duck	43,600	73,600	+69
Black X Mallard	2,600	3,000	+15
Mottled and			
Florida duck	8,200	19,700	+140
Gadwall	31,600	109,100	+245
American widgeon	55,200	118,300	+114
Green-winged teal	69,900	164,100	+135
Blue-winged teal	51,300	197,800	+286
Shoveler	15,500	43,400	+180
Pintail	55,400	108,700	+96
Wood duck	163,500	372,300	+128
Divers:			
Redhead	2,200	4,300	+95
Canvasback	100	200	+100
Greater scaup	11,600	11,800	+2
Lesser scaup	49,600	189,100	+281
Ring-necked duck	92,900	123,300	+33
Goldeneye	6,700	7,600	+13
Bufflehead	11,800	17,200	+46
Ruddy duck	5,800	8,200	+41
Miscellaneous:			
Common and red-breasted merganser	700	2,100	+200
Hooded merganser	6,800	12,800	+88
Oldsquaw and eider	100	900	+800
Scoter	400	1,800	+350
Others and unknown	600	500	-17
Total:			
Retrieved	1,130,800	2,519,800	+123
Not retrieved	316,200	689,500	+118
Ducks killed	1,447,000	3,209,400	+122
Coots:			
Retrieved	80,600	225,900	+180
Not retrieved	24,500	61,900	+153
Coots killed	105,100	287,800	+174

¹Species composition derived from the 1962 and 1963 duck wing surveys.

**TABLE D-15. -- Total bags, by species, and crippling losses of geese in the
MISSISSIPPI FLYWAY during the 1962 and 1963 hunting seasons**

[Bag estimates adjusted for response bias]

Species	1962	1963	Percent change
Geese:			
Canada goose ¹	80,700	106,400	+32
Snow goose	9,400	19,100	+103
Blue goose	31,900	47,400	+49
White-fronted goose	3,600	7,800	+117
Total:			
Retrieved	125,600	180,700	+44
Not retrieved	26,600	35,700	+34
Geese killed	152,200	216,400	+42

¹Includes Hutchins' goose.

TABLE D-16. --Waterfowl hunting activity and bags of ducks and geese in Mississippi Flyway during 1963 hunting season, with 1962 season comparisons

[Estimates unadjusted for response bias]

Hunting season	Duck bag limit	Days in duck season	Total active hunters	Hunter-days		Duck bag		Goose bag	
				Days per adult hunter	State total	Seasonal bag per adult hunter	State total	Seasonal bag per adult hunter	State total
Alabama:									
1962 -----	2-4	25	5,490	6.60	35,900	5.40	28,800	0.58	3,000
1963 -----	4-8	35	9,880	7.08	69,300	7.89	75,600	0.30	2,800
Percent change -			+80	+7	+93	+46	+163	-48	-7
Arkansas:									
1962 -----	2-4	25	8,620	7.29	62,300	8.21	68,600	0.08	700
1963 -----	4-8	35	15,580	6.94	107,100	11.18	168,800	0.10	1,500
Percent change -			+81	-5	+72	+36	+146	+25	+114
Illinois:									
1962 -----	2-4	25	37,230	6.35	234,200	2.96	106,600	0.36	12,700
1963 -----	4-8	35	43,320	6.61	283,700	5.58	234,300	0.45	18,700
Percent change -			+16	+4	+21	+89	+120	+25	+47
Indiana:									
1962 -----	2-4	25	12,860	5.06	64,500	1.38	17,200	0.27	3,300
1963 -----	4-8	32 ¹	13,030	5.01	64,700	1.83	23,100	0.13	1,700
Percent change -			+1	-1	0	+33	+34	-52	-49
Iowa:									
1962 -----	2-4	25	26,080	6.71	173,300	2.68	67,700	0.73	18,300
1963 -----	4-8	32 ¹	32,090	7.69	244,500	6.02	187,200	0.80	24,400
Percent change -			+23	+15	+41	+125	+177	+10	+33
Kentucky:									
1962 -----	2-4	25	4,030	4.99	19,900	1.98	7,700	0.33	1,300
1963 -----	4-8	35	4,960	5.15	25,300	3.43	16,500	0.55	2,600
Percent change			+23	+3	+27	+73	+114	+67	+100
Louisiana									
1962 -----	2-4	25	31,060	6.18	190,200	8.26	248,700	0.86	25,600
1963 -----	4-8	35	57,380	7.37	419,000	15.66	870,800	0.72	39,400
Percent change -			+85	+19	+120	+90	+250	-16	+54

TABLE D-16. --Waterfowl hunting activity bags of ducks and geese in Mississippi Flyway during 1963 hunting season, with 1962 season comparisons (continued)

[Estimates unadjusted for response bias]

Hunting season	Duck bag limit	Days in duck season	Total active hunters	Hunter-days		Duck bag		Goose bag	
				Days per adult hunter	State total	Seasonal bag per adult hunter	State total	Seasonal bag per adult hunter	State total
Michigan									
1962 -----	2-4	25	41,960	5.12	212,700	3.19	129,800	0.28	11,200
1963 -----	4-8	35	58,190	5.64	325,100	3.03	170,800	0.29	16,200
Percent change			+39	+10	+53	-5	+32	+4	+45
Minnesota									
1962 -----	2-4	25	72,140	5.73	409,400	5.39	376,400	0.20	13,600
1963 -----	3-6	35	106,070	5.97	627,400	7.21	741,000	0.22	22,700
Percent change			+47	+4	+53	+34	+97	+10	+67
Mississippi									
1962 -----	2-4	25	6,410	5.95	37,800	6.84	42,500	0.07	400
1963 -----	4-8	35	11,390	6.45	72,800	10.14	112,000	0.08	900
Percent change			+78	+8	+93	+48	+164	+14	+125
Missouri									
1962 -----	2-4	25	23,090	5.25	120,200	1.62	36,200	1.35	29,800
1963 -----	4-8	35	29,490	5.67	165,600	2.96	84,600	1.81	51,000
Percent change -			+28	+8	+38	+83	+134	+34	+71
Ohio									
1962 -----	2-4	25	17,900	5.89	104,500	2.99	51,900	0.14	2,500
1963 -----	4-8	32 ¹	20,730	6.62	136,000	4.37	87,800	0.12	2,400
Percent change -			+16	+12	+30	+46	+69	-14	-4
Tennessee									
1962 -----	2-4	25	7,270	5.40	38,900	2.33	16,400	0.31	2,100
1963 -----	4-8	35	13,390	6.05	80,300	7.41	96,100	0.19	2,400
Percent change -			+84	+12	+106	+218	+486	-39	+14

TABLE D-16. --Waterfowl hunting activity bags of ducks and geese in Mississippi Flyway during 1963 hunting season, with 1962 season comparisons (continued)

[Estimates unadjusted for response bias]

Hunting season	Duck bag limit	Days in duck season	Total active hunters	Hunter-days		Duck bag		Goose bag	
				Days per adult hunter	State total	Seasonal bag per adult hunter	State total	Seasonal bag per adult hunter	State total
Wisconsin									
1962 -----	2-4	25	63,520	7.20	452,900	4.19	257,800	0.39	23,400
1963 -----	4-8	35	82,120	6.40	520,700	4.73	376,400	0.33	26,200
Percent change -			+29	-11	+15	+13	+46	-15	+12
Flyway total:									
1962 -----	---	--	357,640	6.09	2,156,800	4.20	1,456,200	0.43	148,100
1963 -----	---	--	497,610	6.37	3,141,500	6.72	3,244,900	0.45	213,100
Percent change -	---	--	+39	+5	+46	+60	+123	+5	+44

¹Split season.

TABLE D-17. --Total bags of ducks, by species, and coots and total non-retrieved ducks and coots in the ATLANTIC FLYWAY during the 1962 and the 1963 hunting seasons

[Bag estimates adjusted for response bias]

Species ¹	1962	1963	Percent change
Ducks:			
Dabblers:			
Mallard	114,500	140,900	+23
Domestic mallard	1,600	3,300	+106
Black duck	208,900	217,900	+4
Black X Mallard	6,300	6,100	-3
Mottled and Florida duck	13,600	17,300	+27
Gadwall	5,900	17,800	+202
American widgeon	27,400	40,800	+49
Green-winged teal	42,500	61,800	+45
Blue-winged teal	10,400	20,900	+101
Shoveler	3,500	8,800	+151
Pintail	16,500	27,100	+64
Wood duck	116,600	125,000	+7
Divers:			
Redhead	400	1,400	+250
Canvasback	200	300	+50
Greater scaup	32,700	28,400	-13
Lesser scaup	15,400	25,000	+62
Ring-necked duck	46,500	68,600	+48
Goldeneye	14,900	16,800	+13
Bufflehead	14,200	18,800	+32
Ruddy duck	3,600	5,000	+39
Miscellaneous:			
Common and red-breasted merganser	6,100	8,100	+33
Hooded merganser	11,600	15,600	+34
Oldsquaw and eider	4,100	2,800	-32
Scoter	12,000	10,000	-17
Others and unknown	200	400	+100
Total:			
Retrieved	730,700	889,100	+22
Not retrieved	198,400	220,400	+11
Ducks killed	929,100	1,109,500	+19
Coots:			
Retrieved	37,900	47,300	+25
Not retrieved	11,100	15,700	+41
Coots killed	49,000	63,000	+29

¹Species composition derived from the 1962 and 1963 duck wing surveys.

TABLE D-18. --Total bags, by species, and crippling losses of geese in the ATLANTIC FLYWAY during the 1962 and 1963 hunting seasons

[Bag estimates adjusted for response bias]

Species	1962	1963	Percent change
Geese:			
Canada goose	85,500	123,600	+45
American brant	27,600	37,400	+36
Totals:			
Retrieved	113,100	161,000	+42
Not retrieved	18,400	27,300	+48
Geese killed	131,500	188,300	+43

TABLE D-19.--Waterfowl hunting activity and bags of ducks and geese in the ATLANTIC FLYWAY during the 1963 hunting season, with 1962 season comparisons

[Estimates unadjusted for response bias]

Hunting season	Duck bag limit	Days in duck season	Total active hunters	Hunter-days		Duck bag		Goose bag	
				Days per adult hunter	State total	Seasonal bag per adult hunter	State total	Seasonal bag per adult hunter	State total
Connecticut:									
1962 -----	2-4	45 ¹	5,680	6.76	38,100	4.95	27,600	0.19	1,100
1963 -----	3-6	45 ¹	5,680	5.85	33,000	3.41	19,000	0.17	900
Percent change -			0	-14	-14	-31	-31	-11	-18
Delaware:									
1962 -----	2-4	48	4,750	7.94	37,500	4.74	22,000	1.02	4,700
1963 -----	3-6	45 ¹	5,970	7.77	46,100	4.39	25,700	2.62	15,200
Percent change -			+26	-2	+23	-7	+17	+157	+223
Florida:									
1962 -----	3-6	40	15,910	6.02	95,200	6.81	106,100	0.04	600
1963 -----	4-8	40	20,390	5.97	121,100	9.57	191,200	0.03	500
Percent change -			+28	-1	+27	+41	+80	-25	-17
Georgia:									
1962 -----	3-6	40	4,660	5.69	26,300	6.37	29,000	0.09	400
1963 -----	4-8	40	8,580	6.27	53,500	8.16	68,600	0.07	600
Percent change -			+84	+10	+103	+28	+137	-22	+50
Maine:									
1962 -----	2-4	45 ¹	6,810	6.37	43,100	5.33	35,500	0.03	200
1963 -----	3-6	45 ¹	8,070	5.96	47,800	4.87	38,500	0.08	600
Percent change -			+19	-6	+11	-9	+9	+167	+200
Maryland:									
1962 -----	2-4	50	15,740	7.70	117,200	4.45	66,500	3.29	48,900
1963 -----	3-6	50	18,460	6.84	123,700	3.40	64,900	3.22	57,100
Percent change -			+17	-11	+6	-24	-2	-2	+17
Massachusetts:									
1962 -----	2-4	45	12,940	6.12	78,700	3.25	41,200	0.23	2,900
1963 -----	3-6	45	15,630	5.76	89,500	3.52	53,900	0.15	2,200
Percent change -			+21	-6	+14	+8	+31	-35	-24

¹Split season.

TABLE D-19. --Waterfowl hunting activity and bags of ducks and geese in the ATLANTIC FLYWAY during the 1963 hunting season, with 1962 season comparisons (continued)

[Estimates unadjusted for response bias]

Hunting season	Duck bag limit	Days in duck season	Total active hunters	Hunter-days		Duck bag		Goose bag	
				Days per adult hunter	State total	Seasonal bag per adult hunter	State total	Seasonal bag per adult hunter	State total
New Hampshire:									
1962 -----	3-6	36	3,400	5.90	19,900	3.04	10,100	0.04	100
1963 -----	3-6	50	2,730	5.99	16,200	3.61	9,600	0.11	300
Percent change -			-20	+2	-19	+19	-5	+175	+200
New Jersey:									
1962 -----	2-4	50	15,870	6.36	100,300	5.05	78,500	1.75	26,900
1963 -----	3-6	45	18,120	6.76	121,800	5.65	100,300	1.93	36,800
Percent change -			+14	+6	+21	+12	+28	+10	+26
New York:									
1962 -----	2-4	45	36,330	6.45	233,000	4.58	163,200	0.24	8,600
1963 -----	3-6	50	28,370	7.03	198,300	4.85	134,800	0.93	25,400
Percent change -			-22	+9	-15	+6	-17	+288	+195
North Carolina:									
1962 -----	2-4	50	17,380	5.26	90,900	3.30	56,100	1.81	30,400
1963 -----	3-6	50	19,040	5.92	112,000	3.87	72,400	1.75	32,200
Percent change -			+10	+13	+23	+17	+29	-3	+6
Pennsylvania:									
1962 -----	2-4	50	24,550	4.78	116,600	2.52	60,600	0.16	3,900
1963 -----	3-6	50	28,400	4.60	129,900	2.74	76,200	0.28	7,700
Percent change -			+16	-4	+11	+9	+26	+75	+97
Rhode Island:									
1962 -----	2-4	50	1,450	8.41	12,100	4.90	7,000	0.08	100
1963 -----	3-6	50	1,920	7.85	15,000	5.33	10,000	0.07	100
Percent change -			+32	-7	+24	+9	+43	-13	0
South Carolina:									
1962 -----	3-6	40	9,330	7.12	66,100	6.41	58,700	0.13	1,200
1963 -----	3-6	50	11,560	6.45	74,100	6.64	75,200	0.22	2,500
Percent change -			+24	-9	+12	+4	+28	+69	+108

TABLE D-19. --Waterfowl hunting activity and bags of ducks and geese in the ATLANTIC FLYWAY during the 1963 hunting season, with 1962 season comparisons (continued)

[Estimates unadjusted for response bias]

Hunting season	Duck bag limit	Days in duck season	Total active hunters	Hunter-days		Duck bag		Goose bag	
				Days per adult hunter	State total	Seasonal bag per adult hunter	State total	Seasonal bag per adult hunter	State total
Vermont:									
1962 -----	3-6	40	3,110	7.75	23,900	8.06	24,500	0.04	100
1963 -----	3-6	45	2,730	5.19	14,100	5.39	14,400	0.10	300
Percent change -			-12	-33	-41	-33	-41	+150	+200
Virginia:									
1962 -----	2-4	50	10,830	5.52	58,600	4.78	49,500	0.93	10,200
1963 -----	3-6	50	14,460	5.36	76,800	4.52	65,400	1.43	20,600
Percent change -			+34	-3	+31	-5	+32	+54	+102
West Virginia:									
1962 -----	2-4	45	1,210	5.97	7,200	3.90	4,600	0.31	400
1963 -----	3-6	45	990	2.78	2,700	2.79	2,700	0.17	200
Percent change -			-18	-53	-63	-29	-41	-45	-50
Flyway total:									
1962 -----			189,940	6.17	1,164,900	4.52	840,600	0.76	140,600
1963 -----			211,100	6.09	1,275,900	4.84	1,022,900	1.00	200,200
Percent change			+11	-1	+10	+7	+22	+32	+42

TABLE D-20. --Age ratios of mallard determined from wing collections, during hunting seasons 1960-61, 1962-63, and 1963-64

Location of kill	Number of--					
	Wings received			Immatures per adult		
	1961-62	1962-63	1963-64	1961-62	1962-63	1963-64
Pacific Flyway:						
Washington -----	1,259	1,739	2,208	1.1	1.0	1.5
Oregon -----	656	577	1,129	1.8	1.5	1.8
Idaho -----	715	1,328	2,454	0.9	1.0	1.1
California -----	679	734	1,563	1.5	1.8	2.2
Nevada -----	149	178	586	1.7	2.0	2.2
Utah -----	217	708	1,039	2.0	1.9	1.9
Arizona -----	17	59	82	--	2.1	2.2
Flyway weighted ratio ² -----	--	--	--	1.22	1.25	2.2
Central Flyway:						
Montana ³ (E) -----	599	165	269	1.2	2.1	1.1
(W) -----	482	571	662	1.2	1.2	2.5
North Dakota -----	531	988	1,360	1.1	1.2	1.1
South Dakota -----	145	493	1,579	0.5	1.0	1.2
Wyoming (E) -----	57	70	138	1.4	1.5	0.8
(W) -----	12	352	556	-- ¹	1.1	1.0
Nebraska -----	1,210	205	736	0.5	0.5	0.8
Colorado (E) -----	840	403	1,255	0.4	0.7	0.6
(W) -----	101	249	229	0.3	0.8	0.8
Kansas -----	509	315	318	0.6	1.0	0.7
New Mexico -----	140	98	278	0.8	0.8	1.4
Oklahoma -----	129	204	279	0.7	0.6	1.0
Texas -----	139	620	624	0.6	0.8	0.8
Flyway weighted ratio ² -----	--	--	--	0.69	0.94	1.03
Mississippi Flyway:						
Minnesota -----	768	1,722	2,325	1.5	2.2	2.1
Wisconsin -----	772	1,798	1,788	2.0	2.7	2.2
Michigan -----	450	706	687	3.0	3.2	2.8
Iowa -----	560	329	578	1.0	1.6	1.1
Illinois -----	1,007	549	890	0.8	1.0	1.1
Indiana -----	210	178	278	0.8	1.1	1.4
Ohio -----	197	267	388	2.5	2.2	1.9
Missouri -----	597	331	628	1.0	0.8	0.9
Kentucky -----	373	202	257	0.7	0.8	1.2
Arkansas -----	512	896	1,143	0.5	0.7	0.7
Tennessee -----	503	224	316	0.6	0.8	1.1
Louisiana -----	216	830	965	0.3	0.7	0.9
Mississippi -----	135	204	298	0.6	0.8	0.7
Alabama -----	48	188	389	0.7	0.6	1.3
Flyway weighted ratio ² -----	--	--	--	1.08	1.40	1.30
Atlantic Flyway:						
Maine -----	10	25	39	-- ¹	7.3	3.2
Vermont -----	44	42	82	3.0	3.2	5.4
New Hampshire -----	11	7	11	--	--	--
Massachusetts -----	42	92	85	3.2	1.7	1.5
Connecticut -----	65	102	100	4.0	2.2	1.6
Rhode Island -----	22	27	19	3.4	0.6	1.4
New York -----	343	337	598	3.8	2.1	3.0
Pennsylvania -----	124	481	667	2.9	2.1	2.3
West Virginia -----	20	50	59	1.2	1.8	1.9
New Jersey -----	147	306	337	1.3	1.6	1.8
Delaware -----	54	104	121	1.1	1.0	1.4

TABLE D-20. --Age ratios of mallard determined from wing collections, during hunting seasons 1960-61, 1962-63, and 1963-64 (continued)

Location of kill	Number of--					
	Wings received			Immatures per adult		
	1961-62	1962-63	1963-64	1961-62	1962-63	1963-64
Atlantic Flyway: (cont'd)						
Maryland -----	66	311	245	1.4	1.2	1.2
Virginia -----	105	174	225	0.8	1.0	0.8
North Carolina -----	48	101	127	0.9	0.9	1.2
South Carolina -----	101	98	165	0.6	1.3	1.2
Georgia -----	1	28	44	--	1.0	1.5
Florida -----	21	33	56	2.5	1.2	2.4
Flyway weighted ratio ² -----	--	--	--	1.95	1.53	1.72
Continental United States weighted ratio ²				1.05	1.26	1.36

¹ Ratio not shown if based on less than 20 wings.

² In estimating flyway and United States ratios, the ratio for each State was weighted in proportion to the estimated size of the kill in that State.

³ E-East, W-west of the Continental Divide.

TABLE D-21. --Age ratios of black duck determined from wing collections, during hunting seasons 1960-61, 1961-62, 1962-63, and 1963-64

Location of kill	Number of--							
	Wings received				Immatures per adult			
	1960-61	1961-62	1962-63	1963-64	1960-61	1961-62	1962-63	1963-64
Mississippi Flyway:								
Minnesota -----	50	8	44	42	2.3	--	3.0	6.0
Wisconsin -----	114	89	220	156	3.4	3.5	1.7	1.5
Michigan -----	216	200	338	261	2.0	2.5	1.6	1.3
Iowa -----	8	3	5	11	--	--	--	--
Illinois -----	30	52	48	50	2.0	1.4	1.5	1.0
Indiana -----	141	55	57	87	1.2	1.1	1.7	1.1
Ohio -----	207	62	110	194	1.2	1.5	1.3	0.7
Missouri -----	14	4	3	9	--	--	--	--
Kentucky -----	141	126	96	67	1.1	1.0	1.1	0.7
Arkansas -----	27	8	3	11	2.0	--	--	--
Tennessee -----	241	67	85	161	1.3	1.0	1.2	0.9
Louisiana -----	13	3	19	19	--	--	--	--
Mississippi -----	32	7	11	11	2.6	--	--	--
Alabama -----	41	9	75	108	1.9	--	0.7	0.5
Flyway weighted ratio ²	---	---	---	---	1.83	2.04	1.49	1.11
Atlantic Flyway:								
Maine -----	878	379	564	797	3.0	1.8	1.7	2.1
Vermont -----	233	186	232	237	5.5	3.8	3.5	4.6
New Hampshire -----	71	72	193	195	4.9	3.5	2.8	3.4
Massachusetts -----	636	329	566	639	2.2	1.8	1.6	1.8
Connecticut -----	183	122	294	209	2.4	2.1	1.6	3.2
Rhode Island -----	159	93	204	255	1.9	1.0	1.1	1.7
New York -----	435	418	524	613	2.7	2.3	1.6	2.2
Pennsylvania -----	163	73	277	251	3.0	0.6	1.2	1.4
West Virginia -----	66	26	65	60	0.6	0.9	0.4	0.7
New Jersey -----	1,132	712	1,152	1,157	1.9	1.6	1.0	1.1
Delaware -----	200	122	259	276	1.2	2.0	1.6	1.4
Maryland -----	378	131	557	396	1.4	2.2	1.0	1.1
Virginia -----	161	148	247	277	1.6	1.1	1.0	1.1
North Carolina -----	228	59	93	104	1.5	1.7	1.0	1.1
South Carolina -----	46	53	54	95	1.6	1.0	1.1	1.4
Georgia -----	2	---	8	20	--	--	--	0.7
Florida -----	25	24	25	47	4.0	3.0	2.1	1.9
Flyway weighted ratio ²	---	---	---	---	2.11	1.75	1.32	1.51
Continental United States weighted ratio²					2.00	1.82	1.35	1.38

¹Ratio not shown if based on less than 20 wings.

²In estimating Flyway and United States ratios, the ratio for each State was weighted in proportion to the estimated size of the kill in that State.

TABLE D-22. --Age ratios of blue-winged and cinnamon teal determined from wing collections, during hunting seasons 1960-61, 1961-62, 1962-63, and 1963-64

Location of kill	Number of--					
	Wings received			Immatures per adult		
	1961-62	1962-63	1963-64	1961-62	1962-63	1963-64
Central Flyway:						
Montana -----	21	1	11	6.0	--	--
North Dakota -----	8	79	144	--	3.2	3.8
South Dakota -----	3	22	318	--	3.4	2.2
Wyoming -----	8	1	4	--	--	--
Nebraska -----	5	7	127	--	--	4.0
Colorado -----	1	--	4	--	--	--
Kansas -----	6	6	50	--	--	3.8
New Mexico -----	32	--	1	31.0	--	--
Oklahoma -----	1	1	3	--	--	--
Texas -----	11	46	38	--	0.4	0.8
Flyway weighted ratio ² -----	--	--	--	3.64	2.11	2.69
Mississippi Flyway:						
Minnesota -----	45	343	841	2.8	1.7	4.3
Wisconsin -----	50	294	799	1.9	3.6	4.5
Michigan -----	52	75	190	1.6	2.8	6.6
Iowa -----	7	7	349	-- ¹	--	4.7
Illinois -----	4	13	6	--	--	--
Indiana -----	--	7	0	--	--	--
Ohio -----	10	23	44	--	6.7	13.0
Missouri -----	0	5	33	--	--	5.0
Kentucky -----	--	1	--	--	--	--
Arkansas -----	1	--	--	--	--	--
Tennessee -----	0	--	1	--	--	--
Louisiana -----	83	123	165	0.8	0.4	0.7
Mississippi -----	--	1	1	--	--	--
Alabama -----	2	5	12	--	--	--
Flyway weighted ratio ² -----	--	--	--	1.69	1.65	3.13
Continental United States weighted ratio ²				1.83	1.40	2.41

¹Ratio not shown if based on less than 20 wings.

²In estimating Flyway and United States ratios, the ratio for each State was weighted in proportion to the estimated size of the kill in that State.

TABLE D-23. --Age ratios of pintail determined from wing collections, during hunting seasons 1960-61, 1961-62, 1962-63, and 1963-64

Location of kill	Number of--					
	Wings received			Immatures per adult		
	1961-62	1962-63	1963-64	1961-62	1962-62	1963-64
Pacific Flyway:						
Washington -----	167	393	491	1.5	2.5	1.8
Oregon -----	137	287	471	1.4	1.8	2.1
Idaho -----	46	71	136	1.6	1.4	2.7
California -----	1,350	1,675	2,809	0.5	1.0	1.1
Nevada -----	29	44	118	2.2	1.4	2.1
Utah -----	103	563	620	0.4	0.7	0.9
Arizona -----	16	29	47	--	2.6	1.6
Flyway weighted ratio ² -----	--	--	--	0.59	1.09	1.22
Central Flyway:						
Montana ³ (E) -----	37	21	45	0.2	0.9	3.1
(W) -----	29	26	20	0.3	2.3	5.7
North Dakota -----	27	115	240	8.0	2.1	3.4
South Dakota -----	11	136	356	-- ¹	2.0	2.3
Wyoming (E) -----	3	--	5	--	--	--
(W) -----	1	6	10	--	--	--
Nebraska -----	37	30	112	5.2	0.9	1.3
Colorado (E) -----	10	20	54	--	1.9	3.2
(W) -----	--	3	4	--	--	--
Kansas -----	119	73	82	2.8	2.5	1.9
New Mexico -----	24	3	29	1.4	--	0.5
Oklahoma -----	18	21	22	--	1.1	1.9
Texas -----	125	551	580	0.5	0.6	0.8
Flyway weighted ratio ² -----	--	--	--	1.25	1.09	1.40
Mississippi Flyway:						
Minnesota -----	57	94	216	1.9	1.8	3.2
Wisconsin -----	53	253	180	3.4	2.8	3.6
Michigan -----	53	50	50	3.1	1.6	6.1
Iowa -----	31	29	93	14.5	2.6	2.2
Illinois -----	68	64	78	3.3	2.2	1.8
Indiana -----	4	10	6	--	--	--
Ohio -----	21	58	50	2.0	2.9	4.3
Missouri -----	46	62	89	4.1	3.1	2.4
Kentucky -----	--	0	1	--	--	--
Arkansas -----	3	12	14	--	--	--
Tennessee -----	7	6	15	--	--	--
Louisiana -----	187	343	240	0.6	0.6	0.9
Mississippi -----	10	5	9	--	--	--
Alabama -----	31	73	93	1.1	0.4	1.0
Flyway weighted ratio ² -----	--	--	--	1.52	1.30	1.59
Continental United States weighted ratio²				0.76	1.10	1.29

¹Ratio not shown if based on less than 20 wings.

²In estimating flyway and United States ratios, the ratio for each State was weighted in proportion to the estimated size of the kill in that State.

³E-East, W-west of the Continental Divide.

TABLE D-24. -- Age ratios of wood duck determined from wing collections, during hunting seasons 1960-61, 1961-62, 1962-63, and 1963-64

Location of kill	Number of--							
	Wings received				Immatures per adult			
	1960-61	1961-62	1962-63	1963-64	1960-61	1961-62	1962-63	1963-64
Mississippi Flyway:								
Minnesota -----	81	72	308	790	3.0	3.2	1.8	2.6
Wisconsin -----	184	140	717	1,113	2.0	2.2	1.1	1.5
Michigan -----	76	86	333	424	1.6	2.0	1.0	2.0
Iowa -----	73	56	95	406	2.8	3.7	2.4	2.2
Illinois -----	74	102	193	209	3.6	1.6	1.1	2.2
Indiana -----	43	50	147	72	1.9	1.6	1.3	2.8
Ohio -----	118	129	462	417	2.5	2.2	1.8	2.6
Missouri -----	34	30	64	125	7.5	2.3	1.4	1.9
Kentucky -----	11	6	23	13	--	--	0.6	--
Arkansas -----	64	8	143	234	1.0	--	1.0	1.0
Tennessee -----	40	28	22	15	1.0	2.1	1.2	1.4
Louisiana -----	85	58	466	240	1.7	1.4	1.3	1.6
Mississippi -----	70	23	159	9	0.7	0.8	0.6	1.3
Alabama -----	91	29	117	93	1.6	1.1	0.7	1.2
Flyway weighted ratio ²	--	--	--	--	2.06	2.11	1.25	1.81
Atlantic Flyway:								
Maine -----	190	111	108	158	1.6	1.6	1.8	1.1
Vermont -----	96	68	111	96	1.9	2.2	1.6	3.0
New Hampshire -----	10	48	121	59	-- ¹	1.7	2.0	1.4
Massachusetts -----	30	83	114	57	2.3	2.3	1.0	2.9
Connecticut -----	32	7	63	39	3.6	--	1.3	2.0
Rhode Island -----	--	1	--	7	--	--	--	--
New York -----	333	516	357	71	1.9	1.8	1.7	3.1
Pennsylvania -----	88	41	215	397	2.5	1.6	1.8	1.8
West Virginia -----	43	22	49	19	3.8	2.7	1.2	--
New Jersey -----	4	4	56	69	--	--	1.3	2.1
Delaware -----	1	5	1	27	--	--	--	1.8
Maryland -----	8	12	32	29	--	--	1.5	1.0
Virginia -----	43	110	87	84	3.8	1.2	1.8	1.1
North Carolina -----	189	164	202	185	2.2	2.2	1.3	1.8
South Carolina -----	131	112	155	226	1.7	1.3	1.1	1.1
Georgia -----	17	10	61	192	--	--	0.7	1.4
Florida -----	60	85	336	462	2.5	0.9	1.0	1.4
Flyway weighted ratio ² ---	--	--	--	--	2.10	1.66	1.29	1.48
Continental United States weighted ratio ²						1.83	1.28	1.70

¹ Ratio not shown if based on less than 20 wings.

² In estimating Flyway and United States ratios the ratio for each State was weighted in proportion to the estimated size of the kill in that State.

TABLE D-25. --Species composition of geese in the goose kill indicated by the goose-tail collection survey during the 1962-63 and 1963-64 hunting seasons

State	Canada geese		Lesser snow goose		Blue goose		White-fronted goose		Brants		Total		Sample	
	1962	1963	1962	1963	1962	1963	1962	1963	1962	1963	1962	1963	1962	1963
Pacific Flyway:														
Washington -----	86.9	84.0	8.1	8.8	--	--	1.2	0.2	3.8	6.9	100.0	99.9	260	407
Oregon -----	84.5	77.8	11.2	4.9	--	--	4.3	17.1	--	0.2	100.0	100.0	116	428
Idaho -----	98.2	98.2	--	1.8	1.8	--	--	--	--	--	100.0	100.0	57	165
California -----	37.8	41.5	20.5	27.4	--	--	35.4	27.0	6.3	4.1	100.0	100.0	633	892
Nevada -----	100.0	94.1	--	2.9	--	--	--	2.9	--	--	100.0	99.9	7	68
Utah -----	96.3	98.4	3.7	1.6	--	--	--	--	--	--	100.0	100.0	54	64
Arizona -----	83.3	100.0	16.7	--	--	--	--	--	--	--	100.0	100.0	18	28
Flyway weighted ----	54.42	55.50	16.30	20.28	0.07	--	24.52	20.85	4.69	3.37	100.0	100.0	--	--
Central Flyway:														
Montana -----	56.9	51.2	43.1	47.3	--	1.6	--	--	--	--	100.0	100.1	72	129
North Dakota -----	48.9	49.8	37.0	27.4	12.7	6.2	1.4	16.2	--	0.4	100.0	100.0	284	241
South Dakota -----	23.1	39.5	48.1	37.2	27.5	21.9	1.4	1.4	--	0.1	100.1	100.1	516	810
Wyoming -----	100.0	100.0	--	--	--	--	--	--	--	--	100.0	100.0	26	96
Nebraska -----	47.5	74.8	20.2	5.4	25.3	1.8	7.1	18.0	--	--	100.1	100.0	99	111
Colorado -----	100.0	99.2	--	0.8	--	--	--	--	--	--	100.0	100.0	186	256
Kansas -----	36.0	50.0	29.7	22.2	18.0	11.1	16.3	16.7	--	--	100.0	100.0	111	18
New Mexico -----	93.3	89.6	6.7	10.4	--	--	--	--	--	--	100.0	100.0	15	115
Oklahoma -----	77.0	74.8	12.2	13.1	6.8	8.4	4.1	3.7	--	--	100.1	100.0	74	107
Texas -----	42.1	27.3	28.6	42.3	8.1	15.9	21.2	14.5	--	--	100.0	100.0	632	433
Flyway weighted ----	42.92	43.07	31.94	32.87	13.19	12.68	11.95	11.29	--	0.09	100.0	100.0	--	--
Mississippi Flyway:														
Minnesota -----	44.0	40.6	27.1	23.8	28.9	35.6	--	--	--	--	100.0	100.0	166	160
Wisconsin -----	95.5	89.9	1.1	2.8	3.4	7.0	--	0.2	--	--	100.0	99.9	177	527
Michigan -----	94.0	100.0	1.2	--	4.8	--	--	--	--	--	100.0	100.0	83	41
Iowa -----	27.3	40.2	29.3	16.3	42.4	42.4	1.0	1.1	--	--	100.0	100.0	198	92
Illinois -----	92.7	80.6	--	2.8	7.3	16.7	--	--	--	--	100.0	100.0	55	36
Indiana -----	86.4	80.0	4.5	--	9.1	20.0	--	--	--	--	100.0	100.0	22	10
Ohio -----	63.6	--	--	--	36.4	--	--	--	--	--	100.0	--	11	--
Missouri -----	93.4	79.4	2.4	10.9	3.5	7.7	0.7	1.9	--	--	100.0	99.9	286	311
Kentucky -----	100.0	--	--	--	--	--	--	--	--	--	100.0	--	3	--
Arkansas -----	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tennessee -----	100.0	100.0	--	--	--	--	--	--	--	--	100.0	100.0	2	1

TABLE D-25. --Species composition of geese in the goose kill indicated by the goose-tail collection survey during the 1962-63 and 1963-64 hunting seasons (continued)

State	Canada geese		Lesser snow goose		Blue goose		White-fronted goose		Brants		Total		Sample	
	1962	1963	1962	1963	1962	1963	1962	1963	1962	1963	1962	1963	1962	1963
Mississippi Flyway: (cont'd)														
Louisiana -----	--	1.0	2.9	11.8	82.4	67.6	14.7	19.6	--	--	100.0	100.0	34	102
Mississippi -----	--	--	--	100.0	--	--	--	--	--	--	--	100.0	--	1
Alabama -----	100.0	100.0	--	--	--	--	--	--	--	--	100.0	100.0	2	67
Flyway weighted -----	64.25	58.90	7.52	10.55	25.39	26.23	2.83	4.32	--	--	99.9	100.0	--	--
Atlantic Flyway:														
Maine -----	100.0	100.0	--	--	--	--	--	--	--	--	100.0	100.0	2	2
Vermont -----	--	100.0	--	--	--	--	--	--	--	--	--	100.0	--	1
New Hampshire -----	100.0	100.0	--	--	--	--	--	--	--	--	100.0	100.0	2	3
Massachusetts -----	100.0	78.6	--	--	--	--	--	--	--	21.4	100.0	100.0	22	14
Connecticut -----	100.0	100.0	--	--	--	--	--	--	--	--	100.0	100.0	1	6
Rhode Island -----	--	--	--	--	--	--	--	--	--	--	--	--	--	--
New York -----	22.2	63.0	--	--	--	--	--	--	77.8	37.0	100.0	100.0	27	73
Pennsylvania -----	100.0	100.0	--	--	--	--	--	--	--	--	100.0	100.0	34	20
West Virginia -----	--	--	--	--	--	--	--	--	--	--	--	--	--	--
New Jersey -----	3.9	5.1	--	--	--	--	--	--	96.1	94.9	100.0	100.0	77	216
Delaware -----	100.0	97.3	--	--	--	--	--	--	--	2.7	100.0	100.0	63	74
Maryland -----	99.5	100.0	--	--	--	--	--	--	0.5	--	100.0	100.0	590	814
Virginia -----	98.3	88.1	--	--	--	--	--	--	1.7	11.9	100.0	100.0	116	118
North Carolina -----	100.0	100.0	--	--	--	--	--	--	--	--	100.0	100.0	111	296
South Carolina -----	100.0	--	--	--	--	--	--	--	--	--	100.0	--	1	--
Georgia -----	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Florida -----	100.0	--	--	--	--	--	--	--	--	--	100.0	--	5	--
Flyway weighted -----	75.57	76.78	--	--	--	--	--	--	24.43	23.22	100.0	100.0		

TABLE D-26. --Age ratios in the Canada goose kill based on the goose-tail collection survey during the 1962 and 1963 hunting seasons

State	Immatures per adult		Sample size	
	1962	1963	1962	1963
Pacific Flyway:				
Washington -----	0.58	0.55	225	342
Oregon -----	0.44	0.50	95	333
Idaho -----	0.17	0.55	56	161
California -----	1.08	0.33	231	369
Nevada -----	--	0.11	7	62
Utah -----	0.33	0.33	52	61
Central Flyway:				
Montana -----	0.14	0.28	41	64
North Dakota -----	0.86	2.13	138	119
South Dakota -----	0.59	1.38	111	316
Wyoming -----	--	0.28	26	95
Nebraska -----	0.81	0.86	47	82
Colorado -----	1.14	0.94	184	254
Kansas -----	0.89	--	36	9
New Mexico -----	--	0.52	14	102
Oklahoma -----	1.16	0.90	54	80
Texas -----	0.56	1.03	261	118
Mississippi Flyway:				
Minnesota -----	0.92	2.25	73	65
Wisconsin -----	0.67	0.81	167	472
Michigan -----	0.81	0.46	78	41
Iowa -----	0.69	1.18	54	37
Illinois -----	1.94	--	50	29
Missouri -----	1.04	1.71	259	247
Alabama -----	--	0.91	2	67
Atlantic Flyway:				
New York -----	--	2.83	6	46
Pennsylvania -----	1.00	--	34	20
Delaware -----	1.10	1.25	63	72
Maryland -----	1.31	1.89	584	814
Virginia -----	1.07	1.08	114	104
North Carolina -----	1.23	1.27	105	293

TABLE D-27. --Age ratios of geese (other than Canadas) in the goose-tail collection survey, 1962-63

Species	Immatures per adult		Sample size	
	1962	1963	1962	1963
Lesser snow goose				
Washington -----	--	2.27	21	36
California -----	1.45	1.35	130	244
Montana -----	0.93	0.49	31	61
North Dakota -----	0.52	0.78	105	66
South Dakota -----	0.76	0.97	248	301
Kansas -----	0.68	--	32	4
Texas -----	0.83	1.15	179	183
Minnesota -----	0.55	0.90	45	38
Iowa -----	0.87	--	58	15
Missouri -----	--	5.80	7	34
Blue goose				
North Dakota -----	0.80	--	36	15
South Dakota -----	0.84	0.79	142	177
Texas -----	0.55	0.68	51	69
Minnesota -----	0.55	0.58	48	57
Wisconsin -----	--	1.18	6	37
Iowa -----	0.83	0.56	84	39
Louisiana -----	0.65	0.64	28	69
White-fronted goose				
Oregon -----	--	5.08	5	73
California -----	1.95	1.17	224	241
North Dakota -----	--	2.00	4	39
Texas -----	0.84	0.80	134	63
Brant				
California -----	0.60	0.23	40	37
New Jersey -----	0.48	0.78	74	205



DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE
WASHINGTON, D.C. 20240